2\textsuperscript{st} Brazilian Congress in Electromyography and Kinesiology

2\textsuperscript{st} National Meeting of Myotherapy Procedures

Piracicaba, São Paulo, Brazil
April 19\textsuperscript{th} – 22\textsuperscript{th}, 2012

All abstracts appear as submitted by the authors without editing
We are deeply pleased to publish in this important journal the papers presented at the COBEC2012 – 2nd Brazilian Congress of Electromyography and Kinesiology and 2nd National Meeting of Myotherapy Procedures, promoted by the Piracicaba Dental School (FOP/UNICAMP) and the Brazilian Society of Electromyography and Kinesiology (SOBEC).

The COBEC 2012 repeated the success of the previous event, the COBEC 2010. Fostered by SOBEC - Brazilian Society of Electromyography and the Piracicaba Dental School (FOP/UNICAMP), the event was sponsored by many funding agencies for research and had the participation of a significant number of researchers from several institutions involved with Kinesiology and Electromyography in our country, as well as renowned international ones.

COBEC 2012 scientific program included topics that attended to a broad range of interests such as acupuncture, thermography, electroneuromyography, ergonomics, musculoskeletal pains, biomechanics, and diagnosis by electromyography among others. The program also comprised three international conferences, one course, two books launching, ten national lectures, five workshops, one round table and awarding of best scientific works and research ensemble.

The papers presented at COBE 2012 and now published in this reputable journal represent the most up-to-date findings in kinesiologic and electromyographic studies and completely demonstrate that Brazilian electromyography is already established in our country.

The good news is that electroneuromyography is already acknowledging surface electromyography as an important tool for some diagnosis as in inferior alveolar nerve.

The COBEC 2012 also allowed the diffusion of important techniques on myotherapy procedures employed in rehabilitation of musculoskeletal impairments and in treating of painful myofascial cases.

The abstracts presented below were classified into the following areas: Kinesiology, Electrodes, Ergonomics, Neurophysiology, Temporomandibular Dysfunction, Motor Analysis, Postural Analysis, Human Performance, EMG Signal Processing, Physical Medicine and Rehabilitation, Sporting Medicine, Muscle Fatigue, Biomechanics and Musculoskeletal Pain.

For me it was a great pleasure to preside the COBEC 2012 not only for its intrinsic success but mostly for the efficient and dedicated collaboration of students and ex-students of our Oral-Dental Biology Post-grade Program, Department of Anatomy and FOP/UNICAMP Board who eased pathways and supported us in all Congress’ needs.

The Federal University of Paraíba, settled in João Pessoa, will hold the next Congress, the COBEC 2014, on April 18th-21st.

Our most deep thanks to the authors for their valuable scientific contribution. Hopefully, next COBEC 2014 in João Pessoa can count again with their important participation which will certainly help us write another important chapter in the history of Brazilian Electromyography.

Prof. Dr. Fausto Bérzin

President of COBEC2012 and SOBEC
A COMPARISON OF THE PELVIC FLOOR MUSCLE CONTRACTILITY BY MEANS OF DIGITAL PALPATION, DYNAMOMETRY AND ELECTROMYOGRAPHY

INTRODUCTION
Pelvic floor muscle (PFM) assessment methods measure the ability as well as the strength of contraction. Digital palpation and dynamometry are used to evaluate pelvic floor muscle strength, while electromyography (EMG) evaluates the electrical activity of these muscles. Currently, there aren’t standard clinical methods for assessing women’s pelvic floor muscle function. This study aimed to check if there is any correlation among the assessment methods: digital palpation, dynamometry and electromyography.

METHODS
Thirty nulliparous women, without any urinary complaints, with the mean age of 23.58 (±3.32) years, body mass index of 23.01 (±2.74), and without absence of diastasis of the rectus abdominis muscle participated in this study.

Two investigation methods were performed: Group 1 (G1): twenty one women evaluated with the pelvic floor EMG and digital palpation; Group 2 (G2): nine women evaluated with the dynamometry of PFM with digital palpation.

Digital palpation was performed by means of a functional clinical exam using the Modified Oxford Grading Scale (this is a 6-point scale: 0_no contraction, 1_flicker, 2_weak, 3 Moderate, 4_good (with lift), and 5_strong), putting the subjects in supine position, lower limbs flexed with the feet on the stretcher and asking them to contract the PFM and repeat this contraction while the examiner’s index and middle fingers into the vagina.

Dynamometry was done using an intra-vaginal sensor composed of a load cell attached to the EMG equipment (EMG System do Brazil®).

Pelvic floor EMG was performed using a vaginal probe (Physio-Med Services) with the metallic surfaces in contact with the vaginal lateral walls, in microvolts. Three simultaneous contractions were collected. For the statistical analysis an average of three Root Mean Squares (RMS) was calculated. Correlation Coefficient of Pearson and T Student Test were calculated, with significance level for statistical tests was 5%.

RESULTS AND DISCUSSION
Another study compared the contractility of the PFM through vaginal EMG and digital palpation and found a significant correlation between the two means of evaluation. Little is known about pelvic floor dynamometry as a means of investigating muscle strength.

Table 1 – Assessment methods correlation

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean (SD)</th>
<th>Dynamometry</th>
<th>Digital Palpation</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>1.77 (±0.78)</td>
<td>3.22 (±1.56)</td>
<td></td>
<td>p=0.01</td>
</tr>
<tr>
<td>Group 2</td>
<td>45.31 (±16.81)</td>
<td>3.43 (±0.87)</td>
<td></td>
<td>p&lt;0.001</td>
</tr>
</tbody>
</table>

EMG: electromyography
SD: standard deviation

CONCLUSION
This study identified a strong correlation between EMG and digital palpation, whereas a moderate correlation between dynamometry and digital palpation was found, which could have been influenced by the sample size of this preliminary study.

REFERENCES

ACKNOWLEDGEMENTS
To FAPEMIG, for scientific support.
A SOFTWARE PROPOSAL FOR ACQUISITION AND PROCESSING OF ELECTROMYOGRAPHIC SIGNALS

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INTRODUCTION

Electromyography is a monitoring technique of the electrical muscular activity of the human body. The electromyographic signal (EMG) is the algebraic sum of all the detected signals within an area, being affected by anatomic and physiological muscular properties, and by the control of the peripheral nervous system and the instrumentation used for the signal acquisition. (ENOKA, 2000).

The EMG can be used for clinical analysis, advanced studies involving biomedical signal processing techniques and has huge applications in the biofeedback field as it can help in the rehabilitation process of patients with motor dysfunctions and on the adaptation process of a prostheses use. (TUKER, 1993).

The existing softwares for EMG signals manipulation, most of them, don’t provide the source code due to commercial issues and they are usually dedicated to only one job, that is, some applications make the collection but without signal processing support and there are those which don’t make the processing in real time, for example. (CRAM, 1998).

On this context, the proposed software is an interface capable of collecting and processing EMG signals in real time. Then, the proposed system will be able to correspond to a greater variety of users who may demands different tasks to be done with the EMG signal.

METHODS

The developed system is connected to the MyosystemBr1 equipment, which is a high performance instrument for EMG signals acquisition, produced by the Data Hominis Tecnologia and was implemented in the development platform Microsoft Visual C# 2008.

For its development were necessary an integration with a DLL (Dynamic Link Library), which is a native library of the MyosystemBr1 that guarantees the communication with the instrument and holds functions that allow its hardware configuration and the EMG signal collection.

As it can be seen from Figure 1, four classes were created in the program with two being used for the DLL access: 1) responsible for running the existing functions in the DLL; 2) has the necessary structures for their execution.

The other two classes use the DLL access classes. 4) has a new set of structures which return complete information about the equipment; 3) has methods and functions that allow the programming to be developed in a higher level. This class is the main class of the program.

The creation of the interface is done with the data that the equipment sends about itself through the DLL functions. Theses parameters are related to the number of channels and possible gain, cutoff frequency of the filters and frequency sample values, for example.

For the EMG signal collection the concurrent computing was used, using two Threads, as the Figure 2 shows. The data acquisition is done by an Acquisition Thread which runs a function that stores the collected data in a circular buffer that is controlled by a Mutex. The Plotting Thread runs in parallel and access the circular buffer as well for the data reading and the EMG Signal plotting on a graphic.

RESULTS AND DISCUSSION

The developed system is totally integrated to the MyosystemBr1 and allows the configuration of a variety of its parameters. Initially the user must configure the sample frequency, gain and cutoff frequency for the signal filtering for each channel. Afterwards the user can watch the collected signal on a graphic within the acquisition screen. (Figure 3).

The tests carried out showed that the EMG signal is being collected with the programmed frequency sample without data loss. The software presented good response to the simultaneous collection of several channels.

CONCLUSION

According to the obtained results, the system presented the expected results, proving that the created classes were integrated to the native DLL of the MyosystemBr1 and the EMG signal were collected in real time righteously.

However, the software needs a database for user registration, permitting an application personalization and the storage of the collections made.

The application will be a extremely useful tool for EMG signal acquisition and processing and will put together different applications to meet the demand of any scientific research. After the validation of the system new functionalities and the integration of the database as well, new modules driven to miofeedback and biofeedback can be developed to make the system complete.

REFERENCES


ACKNOWLEDGMENTS

Professors Alcimar Barbosa Soares and Angela Abreu Rosa de Sá for the guidance. CNPq for the financial support.
A SYSTEM FOR AUTOMATIC IDENTIFICATION OF THE MYOELECTRICAL ACTIVITY INTERVALS (MAI) IN THE ELECTROMYOGRAPHIC SIGNAL DECOMPOSITION PROCESS

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INTRODUCTION

The electromyographic (EMG) signal is the manifestation of a neuromuscular activity associated with a muscular contraction [1-4]. It is understood by electromyography the technique based on the study of muscle function by analysis of this EMG signals [5]. The process of decomposing electromyographic signals involves obtaining information specific to motor units that are active during muscle contraction.

METHODS

It was used the software MATLAB Release 2009ª for the implementation of all phases of the system. The electromyographic signals taken from the data base available for the tests were sampled at 10,040 kHz, with duration from 10s to 30s, and these signals are with and without filtering, for testing purposes.

A raw EMG signal is composed of Myoelectric Activity Intervals (MAIs), and Myoelectric Non-Activity Intervals (MNAIs), which represent intervals of muscle contraction and relaxation, respectively. The software was divided into seven modules so as to have a functional core (or engine). In Figure 1 the block diagram with the system modules is shown.

The signal passes through a windowing, in other words, it can be segmented into small Windows of 1ms seconds each. For each signal window, it was extracted the following characteristics: Mean Absolute Value - MAV, Standard Deviation, Autocorrelation Coefficient, and these three statistical components are allocated in an characterizing matrix called as ‘matriz_Resultado’. After performing operations with 18 windows with signal noise, it was established the vector pattern of signal noise, which is called ‘vetor_Ruido’.

The threshold for detection of MAIs is determined by using the Euclidian Distance (ED) between the matrices described above and by other operations. Finally, all the window signals are compared with the threshold ‘1m’ defined in such a way that the moments in which the characteristic values surpass the threshold window, this window is stored in an array of corresponding MAIs. In turn, the time when the values are below the threshold given, the window is stored in a array corresponding to MNAIs.

RESULTS AND DISCUSSION

The following figures show the results obtained by separating the MUAPs intervals from the EMG raw signal in regions of activity and regions of noise, in accordance with the software developed. In Figure 2 it is observed the MAIs of a filtered EMG signal with well-defined firing rates and in Figure 3 it is observed the MAIs of an EMG signal without filtering.

CONCLUSION

This paper presented a software that allows users to easily apply the basic steps, but important for the automatic identification of myoelectric activity intervals and, consequently, in the decomposition of electromyographic signals.

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ACKNOWLEDGEMENTS

To FAPEMIG, for scientific support.
ACUTE EFFECT OF ONE SQUAT SERIES WITH VASCULAR OCCLUSION ON STRENGTH AND SURFACE EMG

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INTRODUCTION

Strength training combined with vascular occlusion promotes significant gains in muscle strength with relatively low loads, however, the responsible mechanisms for this training potentiation effect are not clear. The degree of muscle activation seems, partly, to be related to the blood flow reduction during the exercise. Thus, the objective of this study is to determine the acute effect of one squat series with vascular occlusion on muscle fatigue (force impairment), integrated to the surface electromyogram signals (sEMG).

METHODS

In a true experimental study, 12 male trained Jiu-Jitsu athletes (26 ± 1 years, 80.9 ± 2.7kg; 173.4 ± 1.2cm; 130.5 ± 2.6/80 ± 2.3 mmHg) performed one squat series with free weights ranged from 180° to 90° with 80% 1-RM until concentric failure, being randomized (www.randomization.com) into groups Without Vascular Occlusion (WVO) (n=6) and Vascular Occlusion (VO) (n=6) and lower limb evaluated. The quadriceps muscle activation was represented by the sum of the RMS of the Rectus Femoris (RF), Vastus Lateralis (VL) and Vastus Medialis (VM). For the Fmed, we used the mean values of the RF, VL and VM.

The whole sEMG signal recording process was realized according to the SENIAM recommendations (Freriks et al., 2000). The software employed to acquire and process the signals was the digital polygraph BioMed.

Subjects remained seated with the knee at a 60° angle being instructed to perform maximal isometric (MVIC) contractions during 5 seconds with 60 seconds interval between contractions. The largest MVIC was used as reference. The quadriceps muscle activation was represented by the sum of the RMS of the Rectus Femoris (RF), Vastus Lateralis (VL) and Vastus Medialis (VM). For the Fmed, we used the mean values of the RF, VL and VM. The whole sEMG signal recording process was realized according to the SENIAM recommendations (Freriks et al., 2000).

Statistical analyses was performed using SPSS (ver. 18). The data were expressed as mean ± SD. We used the independent Student t test for intergroup (WVO x VO) and paired Student t test for intra-group (pre-post) comparison, with p < 0.05.

RESULTS AND DISCUSSION

There was no significant differences in inter-groups comparison for MIF (p>0.05), although a decrease was observed between groups (WVO = 18.6% and VO = 23.7%), in the RMS (p>0.05) and in the Fmed (p>0.05) at the end of the exercise. However, in the intra-group comparison (pre-post), the squat exercise significantly reduced the strength both on the WVO group (t=-4.98, p=0.04) and VO group (t=-5.46, p=0.03), but with no differences on the RMS and Fmed signals (Table 1).

The non significant changes occurred between groups (WVO and VO) on the MIF and the surface sEMG signals (RMS and Fmed) indicating that both groups behaved similarly at the end of the squat. These findings may be related to the external pressure control applied to occlusion, as latex elastic tubes were used instead of a cuff as observed by Loenneke et al., (2010) and, thus, it is likely that the applied pressure was insufficient to occlusion generation. A second hypothesis relates to the occlusion time (40 seconds) being lower than that observed in other studies (Laurentino et al., 2008).

CONCLUSION

One high intensity squat series, combined with vascular occlusion, did not caused changes in electromyographic parameters in trained athletes, compared to the non blood flow restriction exercise. Perhaps, the lack of vascular occlusion pressure control could have influenced the result.

REFERENCES


Table 1: Muscle force and quadriceps sEMG, with and without vascular occlusion, on trained athletes submitted to one squat series

<table>
<thead>
<tr>
<th>Variable/Group</th>
<th>Without Vascular Occlusion WVO</th>
<th>Vascular Occlusion VO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>Maximum Isometric Force - MIF (kgf)</td>
<td>85.55±6.71</td>
<td>68.90±4.99*</td>
</tr>
<tr>
<td>Root Mean Square - RMS (mV)</td>
<td>0.30±0.04</td>
<td>0.27±0.04</td>
</tr>
<tr>
<td>Median Frequency - Fmed (Hz)</td>
<td>157.48±6.68</td>
<td>161.54±6.78</td>
</tr>
</tbody>
</table>

Note: Student t test; *Significant difference between pre and post-training (P<0.05).
AGE CONTRIBUTION TO THE GAIT COST OF ENERGY AND BIOMECHANICAL IN PHYSICALLY ACTIVE OLDER WOMEN

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INTRODUCTION

The maximum oxygen consumption (VO2max) suffers a decline of about 20% per decade at age 70 years or more. Thus, elderly people carry out their activities in greater exercise intensities than young adults. This age decline in aerobic capacity presents itself as an important limiting factor for elderly functional independence and mobility.

Some published studies have sought to understand how the standard biomechanical influences on energy cost of walking (cw) (Mian et al., 2006; Wert et al., 2010; Hortobágyi et al., 2011). However, it still remains unclear the mechanisms by which movement pattern influences the cw in the elderly. Whereas the reduced economy of movement is clinically relevant, as it is related to an increased perception of effort and predisposes to fatigue and falls, this study aimed to identify the association between age and biomechanical variables and energy cost of walking.

METHODS

The sample was comprised of 37 women, aged between 60 and 85 years (67.49±7.16 years) who were recruited in senior physical activity groups.

Data collection was performed in two days, on the first day was evaluated hip, knee and ankle isokinetic dynamometry in the dominant leg in the sagittal plane movements performed in concentric/concentric 120°/s speed. On the second day data collection, the volunteers were familiarized at their preferred treadmill walking speed (PTWS). Next, we performed measurement of oxygen consumption during 8 minutes of rest and walking. Subsequently, data were collected during 1 minute at the PTWS the variables: kinematics (stride length, cadence, ankle dorsiflexion angle during heel strike and hip extension angle during toe off), electromyographic (multifidus (MU), internal oblique (IO), gluteus maximus (GM), rectus femoris (RF), biceps femoris (BF), tibialis anterior (TA) and gastrocnemius lateralis (GL). The kinematics variables were collected with a system of 3D motion analysis (Vicon®, Oxford, GB), with frequency acquisition of 100Hz. The EMG signal was collected by an 8 channel EMG telemetry with a sample frequency of 2000Hz and Ag/AgCl electrodes with 1 cm of catchment area and 2 cm interelectrodes distance. The positioning of the electrodes and the skin preparation were performed according to the guidelines of the Surface Assesments for Non-Invasive Assessment of Muscles. Furthermore, the positioning of electrodes on the muscle IO and reference electrode was performed according to Marques et al (2012). Oxygen consumption was collected by a indirect calorimetry system na cw was calculated according to the formula: cw= active consumption (ml.kg−1) – rest consumption (ml. kg−1) / walking speed (ms−1).

We used the ten initial walking cycles for the analysis of kinematic and electromyographic variables. For the processing of kinematic variables was used a 4th order Butterworth filter with a 6 Hz cutoff frequency. The EMG analysis was performed by calculating the linear envelope (rectified by entire wave, filtered with low pass filter of 4th order and 10 Hz cutoff frequency, and normalized by the average) in 100 ms before and after the heel strike and toe off.

For statistical analysis we used the Shapiro-Wilk test and Pearson correlation considering significant p<0.05.

RESULTS AND DISCUSSION

In this study the variables associated with age were walking speed (p=0.002; r= -0.48), cw (p= 0.001; r= 0.53), multifidus activation in heel strike (p= 0.01; r= -0.39), hip extension torque (p= 0.04; r= -0.345) and ankle dorsiflexor torque (p= 0.019; r= -0.385). Energy consumption also correlated with BF activation at toe off ( p= 0.04; r= -0.34).

In this study, advancing age is accompanied by a slowing of gait and preferably a higher energy cost for this task. This results corroborates with a study made by Malatesta et al (2004), which states that increasing age is related to a increase in physiological strain that results in greater demand for tasks. This results in a higher energy expenditure than a young person at the same walking speed.

The decrease in MU EMG activation at the heel strike with age can be explained by the decrease in walking speed, which occur with aging. This corroborates with the finding of Anders et al. (2007), Who demonstrated that the walking speed reduction is accompanied of a decreased in the amount of MU activation. Furthermore, the author indicates that the MU has a peak of activation at the heel strike, acting like a spine stabilizer during the deceleration of the shift of the center of mass. Hip extensor and ankle dorsiflexor torques were lower with increasing age. We believe that the decreased hip extensors ability to generate force reflects a diminished ability of gluteus maximus, the main hip extensor muscle to generate torque. The greater muscle decrease efficiency in the hip extension movement, in turn, would be linked to the biceps femoris increase activation during the toe off. Thus, a major requirement of the biceps femoris muscle, secondary agonist in hip extension, resulted in greater muscle activation and therefore the increase in energy cost due do the need of increased motor units recruitment.

CONCLUSION

From the present study, we conclude that increasing age is associated with an increased energy cost of walking and gait biomechanical abnormalities that may predispose elderly to the early occurrence of fatigue.

REFERENCES


AKNOWLEDGEMENTS

FAPESP, CAPES, CNPq and FUNDUNESP for financially supporting this Project.
INTRODUCTION
A considerable research work has been dedicated in the last 20 years on the development of assistive technology (AT), notably in the field of augmentative and assistive communication (AAC) (Pinheiro, 2011). Devices in order to offer to people suffering from severe motor disabilities of various origins, e.g., amyotrophic lateral sclerosis (ALS), tetraplegy, muscular dystrophy, cerebral palsy, etc., associated with disorders of verbal communication, have been developed to become possible their communication with people who are near and have some control over their environment. These devices are operated by the AT with HCI sensors that receive information's given by the user with disabilities to operate a graphic interface (Ghedira, 2009).

In this paper we show the development of an EMG-HCI to interact with an assistive communication software designed for people with severe motor disabilities.

METHODS

EDITIH: THE SYSTEM TO BE CONTOLED
The EDITH system is based on the sequential scan of rows and column, as referred in Fig. 1, and can be controlled by an on-off sensor which will be covered later in this paper. The software aims on giving users a control and communication device for interaction with the environment in which the user lives, integrating the latest advances in the field provided by AAC. The functional interface that offers various facilities (eg, calling a nurse, reading of texts of communication by audio or written, etc.).

Figure 1. EDITH’s virtual keyboard (column-row scanning).

To test the functionality of our project based on EMG-HCI, we have used only the EDITH’s virtual keyboard, shown in Fig. 1.

THE EMG BASED HCI
Bioelectric signals such as the EMG are considered as an alternative mechanism to interact with AT (Pinheiro, 2011). In fact, an EMG device is relatively easy to interact with an HCI (Rosenberg, 1998). However, for a user with severe motor limitations, control of any AT device is not an easy task. For such task, a sensor was developed based on the bioelectric signal EMG to interact with the EDITH software.

EMG SIGNAL ACQUISITION AND PROCESSING
Due to sensitivity of the equipment, in the EMG signal processing, the signal passes through a notch filter of 60Hz. It is necessary to minimize noise interference from the power supply system. With this, we can increase the sensitivity of the equipment, lowering considerably the intensity of fatigue for the user. Following, the signal is rectified by a full wave rectifier and them undergoes a second order Butterworth filter to extract the signal envelope.

RESULTS AND DISCUSSION
The system (EDITH + EMG-HCI) was tested with several different types of people with severe motor limitations. One example was a user with ALS with severe motor limitations including lack of speech, having only limited voluntary control for the eyes and some facial muscles, with EMG signal amplitude of 0-1.5 mV. In this situation, two EMG surface electrodes were placed on the masseter muscle and the reference electrode on the user forehead according to Pinheiro’s recommendations.

In his first use of the system, the user was instructed to select one of the three buttons on the main menu interface of EDITH, succeeding in nine out of ten times that the user was prompted to select an specific button. In a second moment, without further training, the user has obtained an acceptable use of the system in which it could write a sentence of 15 characters correctly in less than 3 minutes. Later, after two hours of assisted training, the user wrote a sentence with 42 characters in 5 minutes. Besides writing, the user could gain domain over other system resources such as watching videos, listening to music, use of specific care functions, activate functions of pre-established phrases (eg, calling the nurse’s attention), etc.

CONCLUSION
Considering only the task of writing on a virtual keyboard, the technique of automatic sweeping combined with the EMG/HCI, presented a performance similar to that obtained with systems based on newly developed AT. Moreover, the method proposed here has a great potential to be exploited, not only in performance but also in relation to the complexity and cost of the final system.

In the near future, with the goal of turn this EDITH tool available to more users, our staff will be working on the development of a multifunctional sensor to meet the diverse needs of users, since each user is unique in its limitations.

REFERENCES

ACKNOWLEDGEMENTS
The authors would like to thank the University of Metz, France, the Federal University of Uberlandia, Brazil, and CAPES for funding this study (project CAPES/COFECUB Ma 627/09)
ANALYSIS OF CO-CONTRACTION INDEX OF MASTICATION MUSCLES AFTER THE APPLICATION OF HIGH CERVICAL MANIPULATION IN INDIVIDUALS WITH TEMPOROMANDIBULAR DISORDER

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INTRODUCTION

The co-contraction of the masticatory muscles is a phenomenon characterized by the simultaneous contraction of two or more muscles involving the joint, such as TMJ. It may occur in the elevator and depressor muscles in individuals with TMD. It is known that vertebral manipulation reestablishes the articular range of motion promotes muscle relaxation and relieves pain. The purpose of this study was to achieve relaxation of the supra-hyoid muscles and consequently, balance of the masticatory muscles during isometric contraction of the jaw elevator muscles after applying the high cervical manipulation.

METHODS

The subjects comprised 6 women with TMD, average of 25.8 ± 6.8 years. Inclusion criterion was the diagnosis of temporomandibular disorder (TMD) according to the Research Diagnostic Criteria for Temporomandibular Disorder (RDC/TMD) Axis I. Exclusion criteria were the following: women in orthodontic treatment, facial trauma TMJ, cervical instability and/or blood flow alterations in vertebral arteries assessed by cervical tests. The subjects comprised 6 women with TMD, average of 25.8 ± 6.8 years. Inclusion criterion was the diagnosis of temporomandibular disorder (TMD) according to the Research Diagnostic Criteria for Temporomandibular Disorder (RDC/TMD) Axis I. Exclusion criteria were the following: women in orthodontic treatment, facial trauma TMJ, cervical instability and/or blood flow alterations in vertebral arteries assessed by cervical tests. The EMG signal was acquired using the BIO-EMG 1000 (Lynx Tecnologia Eletrônica Ltda) with a digital/analog convertor and AzuDado 7.2 software. Surface differential active electrodes (five 10-mm long and 1 mm-wide silver bars, separated by a distance of 10 mm, with 20x gain (+1%), a common-mode rejection ratio (CMRR) higher than 100 dB, with RMS noise level lower than 3 μV. During the EMG recording, the volunteers were seated in a chair, feet on the ground and arms resting on the thighs. The electrodes were positioned in the ventral portion of the supra-hyoid, masseter muscles and in the anterior portion of the temporal muscle bilaterally, in parallel to the direction of the muscle fibers. The skin was previously shaved and cleaned with alcohol 70% to reduce impedance. The ground electrode was fixed to the sternum with hydrosoluble gel. The EMG activities were recorded for 5s, with the subject in maximum voluntary contraction while clenching her teeth with Parafilm® material placed bilaterally between the lower and upper first molars. The procedure was performed in two different periods: pre-intervention and immediately after the intervention. The volunteers received manipulative intervention on each side of the cervical high velocity segment (OAA). Subjects were examined in dorsal decubitus position. The therapist held passively, a gentle traction of the head directed upward, head rotation and the boost with high speed and short range by increasing the rotation parameter. The intervention was carried out by an experienced therapist, specialized in Osteopathy. The cervical segment was considered manipulated when a cracking or popping sound was heard during one of the three attempts or when there was no sound after the third and last attempt. The EMG signal was processed in the Matlab® 6.5.1 software to calculate the RMS. The supra-hyoid muscle co-contraction was quantified using the formula shown in Figure 1.

\[ Co-contraction = \frac{EMG_{agonist}}{EMG_{agonist} + EMG_{antagonist}} \times 100 \]

Figure 1. Equation to calculate the masticatory muscle co-contraction index.

RESULTS AND DISCUSSION

Significant decrease was observed in co-contraction values after the application of high cervical manipulation in all analyzed muscles, according to Table 1. For Pallegama et al., individuals with TMD reported pain, which could possibly unbalance the articular system and overload some muscle activities, such as the supra-hyoid muscles over others during several activities. This way, the high cervical manipulation reestablishes a principle of articular balance during isometric contraction of the elevator muscles by the relaxation of the hyperactive muscles, since the cervical region is closely related to the TMJ.

Table 1 – Mean values and standard deviation of masticatory muscle co-contraction index before and immediately after the high cervical manipulation. Left Temporal (LT); Right Temporal (RT);* significant difference (p<0.05).

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Pre</th>
<th>Post-immediate</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LT (%)</td>
<td>17.09 ± 7.82</td>
<td>8.49 ± 3.15</td>
<td>*0.021</td>
</tr>
<tr>
<td>LM (%)</td>
<td>10.41 ± 4.41</td>
<td>4.51 ± 1.94</td>
<td>*0.018</td>
</tr>
<tr>
<td>RT (%)</td>
<td>16.07 ± 5.05</td>
<td>7.77 ± 2.04</td>
<td>*0.010</td>
</tr>
<tr>
<td>RM (%)</td>
<td>13.17 ± 8.77</td>
<td>5.49 ± 2.96</td>
<td>*0.047</td>
</tr>
</tbody>
</table>

CONCLUSION

According to the study, the immediate effects of high cervical manipulation in individuals with TMD decreased the masticatory muscle co-contraction.

REFERENCES

ANALYSIS OF CORPORAL SYMMETRY IN MORBIDLY OBESE INDIVIDUALS SUBMITTED TO BARIATRIC SURGERY THROUGH COMPUTERIZED PHOTOGRAMMETRY, COVERING THE PRE AND POSTOPERATIVE PERIODS

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2 Nove de Julho University – UNINOVO/SP
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INTRODUCTION

In recent years Brazil has appeared in international frameworks on the epidemiology of obesity. For the morbidly obese after many disappointing attempts to change dietary habits is one of the options for bariatric surgery as an alternative quick and effective treatment, but this abrupt change in body composition can have postural problems related to drastic changes of body symmetry.

To adopting an upright ideal posture we need an efficient system of postural control, which is to control the arrangement of body segments based on information from the visual, vestibular and somatosensory systems, leading to an imbalances and influence the biomechanics of posture (Ferreira, 2006; Ribas, Guirro, 2007).

Among causes of postural changes, excess bodyweight should be specially discussed because of its various consequences, such as decreased stability and increased mechanical stress. Clinical trials on obesity and its systemic consequences in terms of biomechanics are still scarce. The aim of this study is to analyze the body symmetry of adults submitted to bariatric surgery through computerized photogrammetry, covering the pre and postoperative periods.

METHODS

This is a descriptive and exploratory longitudinal study. Five female patients, aged 39.4 (4.6) years, mean body mass index (BMI) of 48.3 kg/m², underwent bariatric surgery in the period Dec 2009 to May 2010, the Department of Gastroenterology, Hospital for State Civil Servants. After placement of markers on anatomical landmarks pre-defined by the Postural Assessment Software (Duarte, 2008) were carried images in the sagittal and frontal planes. These images were evaluated by the software that generated the reports from a routine that examined the variation of angles and distances between the marked points and representing the body segments. There were two tests at different times: 1) One day before surgery and 2) Three months after surgery, these studies were reviewed by a single evaluator that related asymmetries in postural deviations and compared the images obtained before and postoperatively for changes significatives and could lead to important clinical changes. To see differences between the values collected in the pre-and postoperatively, we used the nonparametric Wilcoxon test.

RESULTS AND DISCUSSION

Our data suggest that the postural and biomechanical changes were more significant resulting from sudden weight loss with a consequent decrease in BMI causing the individual to make adjustments to maintain postural balance.

In the anteroposterior view analysis of the corporal symmetry (table 1) we observe an absence of rotation in the horizontal alignment of the head (AHC) in the preoperative, postoperative evolving with clockwise rotation, the acromial (AHA) that were previously aligned with changes in the post had right shoulder higher than the left, the left iliac spine (AHEIAS) higher than the right, showing a slight decrease of the rise in the post, besides the misalignment of the tibial tuberosity (AHTT) stressed that in the postoperative period. Although no statistical significance of these findings are important from the clinical point of view.

In the laterolateral view analysis (table 2), there were increased protraction of the head postoperatively (AHC/C7), trunk flexion preoperatively (probably caused by abdominal volume), with the decrease in weight was in the trunk extension postoperatively (AVT - p <0.05) decrease in anteverision of the pelvis (AHP - p <0.05) before surgery, with a decrease in the postoperative period. These results showed a decrease in lumbar hyperlordosis as a result of the decrease in anterior pelvic tilt which may suggest that reducing of the weight reduced the lumbar stress. However changed the body’s relationship with gravity changing the postural control abruptly which can create tension in groups that were not previously required.

CONCLUSION

After bariatric surgery we found significant changes in body symmetry directly affect the positioning and musculoskeletal tension in antigravity muscle groups.

REFERENCES


Table 1 – Values of anteroposterior analysis in preand postoperative periods

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Q1</th>
<th>Median</th>
<th>Q3</th>
<th>p-value</th>
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<tr>
<td>AHC</td>
<td></td>
<td></td>
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<tr>
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</tr>
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</tr>
<tr>
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</tr>
<tr>
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<td>PÓS</td>
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<td>1.65</td>
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<tr>
<td>AHEIAS</td>
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Wilcoxon test; p<0.05.

Table 2 – Values of laterolateral analysis in preand postoperative periods

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<th>Q3</th>
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<td>83.65</td>
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Wilcoxon test; p<0.05.

Braz J Oral Sci. 11(2):158-347
ANALYSIS OF ELECTROMYOGRAPHIC ACTIVITY IN SPASTIC BICEPS BRACHII MUSCLE FOLLOWING NEURAL MOBILIZATION

INTRODUCTION
The sensory, motor and/or cognitive sequelae of a stroke can lead to impaired functional capacity, diminished independence and a reduction in quality of life (Aguiar & Rocha, 2008). Spasticity is another characteristic consequence of central nervous system injuries (Pontes et al., 2000). This motor disorder is characterized by an increase in resistance to passive muscle stretching, dependent on the velocity of the stretch, causing hyper-excitability of the stretch reflex, elastic hypertonia and changes in proprioceptive sensitivity, often accompanied by clonus, flexor and/or extensor spasms and contractures. Neural mobilization is one of the techniques currently used to reduce spasticity in individuals suffering from neurological disorders (Marinzeck, 2010).

The aim of the present pilot study was to determine the influence of neural mobilization on spasticity in patients with stroke sequelae.

METHODS
The sample consisted of six adults with stroke sequelae (four men and two women) with a mean age and standard deviation of 54.16 ± 7.9 years, height of 1.70 ± 0.09 m, body mass index (BMI) of 24 ± 6.5 Kg/m² and an average of four years elapsed since the stroke.

Volunteers first underwent an anthropometric examination and an assessment of the degree of spasticity in the elbow flexor muscles using the Modified Ashworth Scale. An electromyographic assessment of the biceps brachii muscle of the affected upper limb was also carried out. After the initial electromyographic activity was recorded, neural mobilization of the median nerve was carried out (Upper Limb Neurodynamic Test or ULNT1) on the non-affected upper limb. The electromyographic signal of the biceps brachii muscle of the affected upper limb was recorded again after neural mobilization.

RESULTS AND DISCUSSION
Davies (1997) found that the range of motion in one part of the body was altered by passive movements in another part of the body distant from where the original movement occurred, stating that performing ULNT1 on the healthy upper limb may assist movement of the plegic limb. The findings of the present study corroborate this report, as a change in the electromyographic activity of the spastic biceps brachii muscle was found following neural mobilization of the contralateral limb, demonstrating that neural mobilization using contralateral techniques influences the affected limb. This corroborates the statement by Butler (2003) that the central and peripheral nervous systems are considered a single continuous system upheld by three dimensions: mechanical continuity, as evident in the transmission of forces and movements generated by connective tissue sheaths in nerve cells; electrical continuity, maintained by neurons and transmitted from one part of the body to another; and chemical continuity, maintained by central and peripheral neurotransmitters and axoplasmic flow, the function of which is to ensure that nutrients from the nervous system are guided into the axon. The same author reports that, since the tissue tract is continuous, any limb movement has mechanical consequences in the neuroaxis.

CONCLUSION
Although the application of this technique did not result in significant differences, a reduction in electrical activity was found in the spastic muscle after neural mobilization of the contralateral limb, demonstrating that this technique could be an additional tool in the control of spasticity, particularly in cases of lesser intensity.

REFERENCES
INTRODUCTION

The surface electromyography has been widely used in scientific research, primarily because it is a non-invasive technique that can help evaluate the neuromuscular system. Multiple electrode placement strategies have been reported. However, information on the reference electrode (RE) placement is scarce in literature. There is no standardization as to the position of the electrode for all the target muscles in the literature, nor in electromyography international societies. Because the impedance of the skin is irregular, the distance between the RE and the electrodes, as well as their placement, could interfere with the detected electromyographic signal. This aim of this study was to analyze the electromyographic signal at different RE placements.

METHODS

The subjects consisted of 18 healthy women (BMI: 21.20 kg/m² ±1.72, average age: 21.94 ±1.98). Data was collected in one day. The participants had their maximum voluntary isometric contraction (MVIC) of the forearm flexor muscles of the non-dominant upper limb tested and were asked to clench at 50% of their MVIC for 4 seconds. The procedure was carried out six times, with a 60 second interval between them.

After a 30 minute rest, the RE was placed randomly, by drawing, on 4 different places: the contralateral ulnar styloid process; ipsilateral biceps brachii muscle; lateral malleolus of the contralateral ankle; and ipsilateral acromion.

For each RE position, a signal of the biceps brachii muscle was acquired during the forearm for each RE position, a signal of the biceps brachii muscle was acquired at 100% and 50% of MVIC, during the forearm flexion movement, as well as at rest. For each situation, three repetitions of 4 seconds each were made, with 1 minute interval between them, and a 5 minute interval between each condition.

During the collection of submaximal contractions, the volunteers received visual feedback generated on the computer screen, by a load cell positioned perpendicularly to the forearm and the ground, attached with steel chains. The active electrode was positioned on the belly of the biceps brachii muscle according to the SENIAM guidelines, after cleaning and shaving the skin region.

The analyzed parameters refer to the raw and normalized root mean square (RMS) by the MVIC and median frequency (MF).

Mann-Whitney test or ANOVA was used, followed by Tukey test, with a significance level set at 5%.

RESULTS AND DISCUSSION

As shown in Table 1, no significant differences were observed for RMS and MF during the 50% of MVIC in different reference electrode placements. These results suggest that when similar equipment is used, the differences of the distances between the detection sensor of EMG signals and RE, as well as the RE placement location do not interfere in the electromyographic signal.

The values obtained showed that even when the RE was placed on electrically neutral areas, such as the muscle belly of the biceps brachii, there were no significant changes in RMS and MF values, even in different levels of contraction. The same was observed in relation to the RE and the detection sensor of the EMG signals. Even at extreme distances (contralateral lateral malleolus) the RE placement did not interfere in the value of the analyzed variables.

Therefore, this study suggests that the RE placement should not limit the study to be developed when there is a lack of possibilities for its placement. However, further studies should be carried out to better explain this subject.

CONCLUSION

No difference between the raw RMS and normalized RMS was observed in any of the different reference electrode placements or in muscle contraction levels. This finding shows that, even though special care should be given to RE, there are several possibilities for its placement without significant changes in the RMS and FM.

REFERENCES


Table 1. Mean values ± standard deviation of the raw (R) or normalized (N) root square mean by maximal voluntary isometric contraction (MVIC) and median frequency (MF) of the electromyographic signal of the biceps brachii muscle at different contraction levels (100%, 50% of MVIC and at rest) and reference electrode placements (acromion, biceps brachii, malleolus muscles and ulnar styloid process) n=18.

<table>
<thead>
<tr>
<th>Contraction level</th>
<th>Localization of reference electrode placement</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ipsilateral Acromion</td>
<td>Ipsilateral Biceps brachii</td>
</tr>
<tr>
<td>R-RMS (μV)</td>
<td>100% MVIC</td>
<td>209.68 ±64.28</td>
</tr>
<tr>
<td></td>
<td>50% MVIC</td>
<td>122.92 ±57.49</td>
</tr>
<tr>
<td></td>
<td>Rest</td>
<td>7.28 ±3.43</td>
</tr>
<tr>
<td>N-RMS (%)</td>
<td>100% MVIC</td>
<td>96.28 ±19.17</td>
</tr>
<tr>
<td></td>
<td>50% MVIC</td>
<td>55.22 ±18.79</td>
</tr>
<tr>
<td></td>
<td>Rest</td>
<td>3.43 ±2.92</td>
</tr>
<tr>
<td>MF (Hz)</td>
<td>100% MVIC</td>
<td>54.97 ±8.95</td>
</tr>
<tr>
<td></td>
<td>50% MVIC</td>
<td>54.51 ±8.70</td>
</tr>
<tr>
<td></td>
<td>Rest</td>
<td>26.55 ±14.34</td>
</tr>
</tbody>
</table>
ANALYSIS OF ELECTROMYOGRAPHY BEHAVIOR OF QUADRICEPS MUSCLE DURING AN EXPERIMENTAL PROTOCOL OF ISOMETRIC FATIGUE
Borges DT, de Farias RS, Amaro IM, Alano C, Locks F, Brasilheiro JS

INTRODUCTION
Preliminary studies suggest the use of the electromyography (EMG) surface to make inferences about muscle fibers of certain groups (Beck et al., 2009, Chandramouli et al., 2010). The superficial portion of the femoral quadriceps muscle is the most commonly used in these studies and previous research suggest that the medialis vastus (VM) is composed of approximately 50% of type I muscle fibers, the vastus lateralis (VL), by 30% being the rectus femoris (RF) consisting predominantly type II fibers (Mathur et al., 2005).

Based on existing literature and noting the lack of evidence concerning the composition of the femoral quadriceps muscle, this study intends to analyze the behavior of VM, VL and RF during an experimental protocol of fatigue.

METHODS
It is an experimental study, controlled clinical randomized and double blind, held at the neuromuscular performance analysis laboratory (LAPERN) of the Federal University of Rio Grande do Norte (UFRN). 60 healthy volunteers were selected, of both genders, with average age of 23.6 ± 4.2 years, divided into two groups: Group of men (GM-30) and women’s group (GW-30).

The criteria for inclusion are all volunteers should be physically active and does not submit neuromuscular diseases that obstruct the execution of the research protocol. The exclusion criteria would be excluded individuals who could not fulfill the search protocol properly and/or that referred pain or discomfort during procedures. No subject was excluded from the search.

For acquisition and processing of EMG was used a signal conditioner module (MCS 1000) of 4 channels (EMG System of Brazil ®) with an analog-to-digital-converter A/D (CAD, 12/36-60 k) with a resolution of 12 bits. The equipment has a common-mode rejection ratio (RRMC) > 80 Db, with sampling frequency configured in 2000 Hz and the signal was filtered between 20 and 500 Hz, signals were amplified in 1000 times. The software used was the EMGlab (EMG System of Brazil ®, Brazil). Were used self-adhesive electrodes (Noraxon ®, USA), simple differencing surface with an inter-electrode distance of 2 cm and a reference electrode monopolar self-adhesive type also (Noraxon ®, USA). The electrodes were placed in accordance with criteria established by SENIAM and the reference electrode was putted on tibia. For isokinetic dinamometria was used a computerized isokinetic dynomometer (Biodex ® Multi-Joint System 3 Pro, USA).

The muscular fatigue protocol was held in isokinetic dynomometer and consisted of a single series and a repetition of knee extension submaximum isometric of dominant member (Mathur et al., 2005).

The EMG activity was registered at the same time the protocol of muscle fatigue. And for analysis of the data was considered the initial and final values of corresponding electromyography signal during windows of time between 0-5 seconds and 50-55 seconds, respectively.

RESULTS AND DISCUSSION
With respect to variable RMS the VMO muscle showed no significant difference between genders at the beginning of the experimental protocol of fatigue (p = 0.035) (Figure 1). The VL presented gender differences in onset (p = 0.011) and at the end of the experimental protocol of fatigue (p = 0.011) (Figure 2). The difference between muscle RF presented before genres (p = 0.005) and after (p = 0.017) fatigue experimental protocol (Figure 3). With respect to variable Fmed showed no significant difference between genders.

CONCLUSION
In spite of this study have demonstrated differences in gender RMS to muscles evaluated, the fact there did not have been differences in the variable Fmed makes impossible conclusions about the fibers contents in the muscle groups evaluated.

REFERENCES
ANALYSIS OF KINEMATIC PARAMETERS INDICATORS OF INCREASED RISK OF FALLS IN OLDER ADULTS DURING SIMULATED STREET CROSSING

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INTRODUCTION

Aging is related with changes in sensory and motor functions that may compromise the ability to perform complex motor tasks and can impair the ability to perform complex motor tasks and are associated with the high rates of falls among older adults. The risk of falls is multifactorial and more than 50% of cases of older adult falls occur during the gait. Thus, the ability to walk efficiently and safely is important for the maintenance of independence and health by reducing the risk of falls. Crossing the street safely is a complex task, since it implies the coordination of sensory stimuli, cognitive and motor. This functional motor act is particularly difficult for older people, because due to sensorimotor deficits related to age, may be an increased risk of falls in this population, culminating in fatalities and serious injuries. When pedestrians, particular elderly, cross the street while performing other tasks, the risks related to the occurrence of accidents can increase considerably. The aim of this study was indentify changes in gait kinematic parameters indicators of risk of falls in the elderly during simulated street crossing.

METHODS

Participated in the study 17 younger (22±2) and 18 older women (65±3). The sample size was determined based on a pilot study data and using the program G*Power (power=0.95, effect size=1.21, α error=0.05). The exclusion criteria were more than low risk of falls on the Berg Balance Scale (for older volunteers), musculoskeletal pain, fractures or severe soft tissue injury during the prior 6 months, or neurological, cardiovascular or respiratory diseases. The kinematic data were recorded in the sagittal plane using a digital camera (Panasonic® NVGS 320) operating a 100fps. The kinematic data was analyzed using the software Vicon® 9.0 – (Peak Motus). To collect the kinematic data reflective markers placed on the right lateral malleolus and left medial malleolus. The gait tests were performed on the treadmill. Before beginning of the gait tests, the subjects performed a familiarization trial by walking on the treadmill at their self-determined preferred gait speed. After the familiarization, the tests were completed during two different gait conditions: normal gait and simulated street crossing. During normal gait the volunteers were asked to walk on the treadmill at their preferred speed for 3 consecutive minutes. After the normal gait test, the simulated street crossing was completed at the preferred speed also for 3 minutes. During the simulated street crossing condition, the volunteers were told to walk on the treadmill at their preferred speed and at the same time pay attention to traffic light simulator which changed color randomly. When the lights changed color the volunteers had to say which color was lit. The 10 initial gait cycles of both conditions was analyzed. The kinematic data was used to determine the gait cycles. Heel strike was defined as the point where the heel marker was at its most forward position during the gait cycle. The data of stride length and stride time were analyzed. To compare the variables during the gait conditions, the Student T test (within group) and Student T test for independent samples (between groups) were used. The significance level was set at p<0.05. All statistical analyzes were performed using the software PASW statistics 18.0 (SPSS.inc).

RESULTS AND DISCUSSION

Figure 1 shows the values for the stride length for the young and elderly groups in the gait conditions evaluated. There were significant differences between groups for the normal gait and simulated street crossing (p = 0.005 and p=0.001 respectively). In the intragroup comparisons, significant differences were found between the normal gait and simulated street crossing for the elderly group (p=0.001). Table 1 shows the values for the stride time for the young and elderly groups in the gait conditions evaluated. There were significant differences between groups for the simulated street crossing (p=0.003).

CONCLUSION

Our results suggest that simulated street crossing can modify the gait kinematic parameters in elderly people, increasing the risk of fall in this population.

REFERENCES


ACKNOWLEDGEMENTS

The authors wish to thanks the funding providing by FAPESP, CNPq, Capes and Fundunesp.
ANALYSIS OF KINEMATIC, KINETIC AND ELECTROMYOGRAPHIC PATTERNS DURING THE PREPARATION OF ROOT CANALS WITH ROTARY AND MANUAL INSTRUMENTS

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2 Physical Therapy Course – UFU/IMG, Brazil
3 Dental School of Ribeirão Preto – USP/SP, Brazil
E-mail: vcdionisio@gmail.com web: www.ufu.br

INTRODUCTION

Régis-Filho (1997) demonstrated, through the kinematic, kinetic and electromyographic (EMG) registrations, that endodontics, and more specifically root canal preparation, is an odontological practice that commonly causes work-related musculoskeletal disorders (WMSD), surpassing others clinical procedures.

Some authors have suggested that, besides these factors, the preparation of root canals using nickel-titanium (NiTi) instruments is associated with the least stress and operating fatigue, especially due to the decrease in working time when compared with manual instrumentation with stainless steel (Tasdemir et al., 2005). The objective of this study was to verify, in vivo, the results obtained from the kinematic, kinetics, and EMG records in endodontists during the preparation of simulated root canals using rotary and manual instrumentation techniques.

METHODS

Eight right-handed healthy subjects, four females and four males, between 23 and 39 years of age, participated in this study. All of them were endodontists with clinical experience accumulated over at least two years. Each endodontist, seated on an odontological stool in the “12 o’clock” position, prepared two simulated canals with 20 millimeters in resin blocks with diameters corresponding to an instrument size 20 and curvatures of 40° (Crinodonto Produtos Odontológicos, Curitiba, Paraná, Brazil). RaCe 25.02 rotary Ni-Ti (FKG, La Chaux-of-Fonds, Orbe, Switzerland) and Flexo-file 25.02 (Dentsply-Maillefeber, Ballaigues, Orbe, Switzerland) instruments were used. The resin blocks were attached to a lathe machine and prepared. In the cervical third, the preparation was carried out with rotary Pre-RaCe instruments 40.10 and 35.08, following the crown-down instrumentation procedure, where the dentist essentially works from the crown of the tooth, shaping the canal towards the apex. The instruments are used in a large to small sequence. Flexo-files 40.02, 35.02 and 30.02 were used by the manual group, RaCe 25.06 and 25.04 instruments by the rotary group. The purpose was to reach the working length (WL=20 millimeters) with the 25.02 instrument. Once the WL was reached, ten repetitions of three seesaw movements each were carried out while data was collected on muscular activity over 4-second periods.

EMG signals were collected using surface electrodes (model 2.2L Delsys Inc., Boston, MA, USA). They were attached over the flexor carpi radialis, extensor carpi radialis, brachioradialis, biceps brachii, triceps brachii, middle deltoid, and upper trapezius. The EMG signals were amplified (x2000), band-pass filtered (20-450 Hz) and recorded. The data were digitized at 12 bits and registered at 1000 Hz. For the analysis of the movements, the X, Y, and Z coordinates were recorded utilizing LED (Light Emission Diode) markers fastened to the temporomandibular joint, to the shoulder, elbow, wrist, and hand. The infrared signal emission of these markers was captured at a frequency of 100 Hz, by a three-dimensional OPTOTRAK 3020 optical system (Digital Northern Inc., Waterloo, Ontario, Canadá).

Data Processing

The EMG signals, and the X, Y, and Z positional data were synchronized by an ODAU II – Optotrack Data Acquisition Unit II, and mathematically treated using Matlab Code (Math Works Inc., version 6.0). The joint torque averages (Nm/Kg) for the shoulder, elbow, and wrist, as well as the EMG signal normalized values were calculated at intervals of 100 ms each, starting from the beginning of the movement of the wrist assessed by measuring the angular displacement.

REFERENCES


RESULTS AND DISCUSSION

Kinematics and kinetics

There were differences between the results obtained with the use of manual and rotary techniques with regard to the variables of the minimum (min.), maximum (max.) angular displacements, and angular excursion (AE) for the shoulder, and low and maximum angular displacement for the wrist (p<0.04). Through the comparative kinematic analysis performed in this study, the angle displacements for the wrist and elbow verified during the preparations using rotary or manual instruments were classified as low risk. As for the shoulder, these movements were classified as medium risk (Branson et al., 1998).

There was no difference in the joint torques for shoulder (p=0.94), elbow (p=0.88) and wrist (p=0.85).

Electromyography

For normalized EMG was observed for the manual method that there was a higher EMG activity in the extensor carpi radialis, flexor carpi radialis and brachioradialis muscles, and lower EMG activity in the middle deltoid and upper trapezius compared with the rotary method (p<0.0001). The biceps brachii and triceps brachii did not show statistically significant differences in relation to the preparation methods (p>0.05). The explanation for the occurrence of a higher EMG activity during use of the manual instrumentation lies in the very fact that there is a need greater apprehend of instruments to execute the task. The wrist and the elbow position are fundamental for this execution. In the procedure with rotary instruments there is the need to hold the equipment, but less effort is required to penetrate and work on the interior of the root canals. In this case the subjects utilized a different motor strategy, using the muscles closer to the shoulder.

CONCLUSION

The angular displacement of the wrist and elbow using rotary and manual instruments were classified as low risk in terms of the occurrence of work-related musculoskeletal disorders. A higher level of muscular activity was verified in the majority of the muscles assessed, although the motor strategy was shown to be distinct for each of the two techniques tested.
ANALYSIS OF PERFORMANCE AND MOTOR SKILL MANUAL OF PATIENTS WITH DYSKINETIC CEREBRAL PALSY

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INTRODUCTION

The upper limb function in patients with cerebral palsy Dyskinetic (PCD) is compromised by interference from involuntary movements concomitantly cotidiano volunteers. A better understanding of the movements in these patients, especially those found in adulthood is of fundamental importance for clinical decision making. The kinesiological assessment by three-dimensional kinematic analysis is considered a potential instrument for measuring clinical results and has helped to demonstrate how functional activities, such as the movements involved in the act of taking a cup to mouth, are carried out by impairment in patients with limb top.

The objective of this study was to investigate the correlation between the temporal kinematic parameters, speed and dexterity involved in the movement to bring a mug to his mouth in adult patients with PCD.

METHODS

The study was conducted at the Laboratory for the Study of Movement, Physiotherapy Clinic and approved by the Ethics Committee (299/07). We evaluated 16 young adults (29.63 ± 4.42 years), patients with dyskinetic cerebral palsy type (PCD), 11 males and 6 females. The classification of manual ability was made with the aid of shooting through the scale (MACS Manual Ability Classification System) by an evaluator blinded and calibrated using as reference the ability to hold patient’s.

The evaluation was performed by the movement of motion capture, using nine infrared cameras Vicon ® MX40(Oxford Metrics Group, Oxford, UK) with a frequency of 60 Hz reconstruction of the markers were made by Vicon Nexus ® program and the processing of the model proposed by Rab, Petuskey, Bagley to estimate the segment head, torso, pelvis, arms, forearms, hands, and third fingers was made in accordance with the recommendations of the International Society of Biomechanic (ISB) in the program Smart Analyzer ® (BTS spa, Milan, Italy) 5 and were normalized by percentage of each cycle of movement.

Patients were placed in an adjustable chair, keeping your feet flat on the ground, 90° of knee flexion and hip, torso upright and leaning against the backrest, fixed with a cross band on the chest to maintain stability, dominant upper extremity resting on a table in front, with a slight shoulder flexion and elbow. A total of six repetitions of the task of taking the cup from the table, which was 75% of its maximum range, lead to the mouth (PHASE SET), to simulate the act of drinking, the cup and return to your starting point were performed for each patient.

The temporal variables: time of departure (s), setting time (s) return time (s) speed: average speed (m / s), speed (m / s) and time to reach maximum speed (s) were correlated with the outcome and functional ability using the Spearman rank correlation test after normality.

RESULTS AND DISCUSSION

There were no correlations between the MACS and the temporal variables and between the MACS and the variables of speed. Moderate positive correlation was found between the mean velocity and MACS (r = 0.562) and between the MACS and the maximum speed attained (r = 0.635).

A correlation between the phase outward and return phase (r = 0.559), showing that the turnaround time is longer than the outward due to a deceleration of the movement in order to achieve greater precision during the motor action.

A correlation between the phase-way and time to reach maximum speed (r = -0.518), suggesting that the longer the higher the peak velocity phase of bringing the cup to mouth.

The correlation between average velocity and peak velocity (r = 0.947) demonstrates that a higher maximum speed the greater the speed of movement.

We also found correlation between the adjustment phase and the maximum speed (r = -0.562), and the adjustment phase and average speed (r = -0.635).

CONCLUSION

The ability to grip is not correlated with the time round, even with variable speed. Correlation was observed between the stage and back, and speed variables during analysis of the movement to bring a cup to his mouth.

REFERENCES

ANALYSIS OF SIGNS AND SYMPTOMS OF TEMPOROMANDIBULAR DYSFUNCTION IN MOUTH BREATHING CHILDREN

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INTRODUCTION
The mouth breathing syndrome (MBS) is characterized by oral or mixed breathing that can result in changes not only in the devices involved with respiration, as well as myofunctional alterations that modify the body axis and its dynamics1. The syndrome is multifactorial, and allergic rhinitis and adenoid hypertrophy of the most common causes2. Persistent mouth breathing during the child’s growth can determine a series of morphofunctional changes in the craniofacial region, since this is a period of adaptive physiological changes in the temporomandibular joint (TMJ)3.

The TMJ dysfunction are considered a set of joint and muscle dysfunction in the cranio-orofacial region, being mainly characterized by joint pain and/or muscle noise at TMJ and limited or irregular jaw function3. The present study aims to evaluate the signs and symptoms of TMJ dysfunction in mouth breathing children.

METHODS
This is a cross-sectional clinical study, not controlled, composed of children aged between seven and twelve, of both genders, from five schools of Elementary School Hall of Vitória (ES). The study was approved by the Ethics Committee in Research of Federal University of Espirito Santo, under protocol 162/2010. The study included children with features suggestive of mouth breathing, second medical and dental evaluation.

Children characterized as MB were evaluated for TMJ. It was verified by inspection of the occurrence of pain and lateral deviation of the mandible during active movements of mouth opening and protrusion. The deviation in intercuspal position (ICP) was measured by the distance between the upper and lower lips pursed. The occurrence of clicks and/or crackles in TMJ was evaluated by palpation. The overjet was measured by the distance between the edge of the vestibular and lower central incisors in the ICP. Range of motion (ROM) and the occurrence of pain were evaluated during the movement of maximum opening, lateral deviation, protrusion, and retraction of the jaw. The occurrence of pain in the masseter and temporal muscles was assessed by palpation. For quantitative data we used a caliper.

RESULTS AND DISCUSSION
The study included 88 MB children with a mean age of 9.1 ± 1.5 years, 50 (57%) were male.

Eighty (91%) MB children had deviation in mouth opening, which, according to the literature may be due to a dislocation of the condyle, which is not physiologically able to return to the starting position, causing asymmetry of movement.

The deviation in ICP was present in 75 MB children, 55% right and 45% left. Among the MB children, 51% presented deviation to the left and 33% with deviation to the right during the protrusion. Asymmetry of mandibular movements and deviations in the trajectory of the jaw are usually associated with, among others, the presence of pain, and morphological changes of the TMJ.4

Clicking was present in the 13% of children and crackles at 6%. Authors argue that the clicking occurs due to displacement of the articular disc, since crackles has been found in more advance stages of TMJ dysfunction. Table 1 below shows the averages of ROM obtained during the assessment of mandibular movements.

<table>
<thead>
<tr>
<th>ROM</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum opening (mm)</td>
<td>46.5 ± 7.8</td>
</tr>
<tr>
<td>Right (mm)</td>
<td>8.1 ± 3.2</td>
</tr>
<tr>
<td>Left (mm)</td>
<td>7.8 ± 3.0</td>
</tr>
<tr>
<td>Retrusion (mm)</td>
<td>2.1 ± 1.8</td>
</tr>
<tr>
<td>Protrusion (mm)</td>
<td>6.7 ± 2.4</td>
</tr>
<tr>
<td>Overjet (mm)</td>
<td>3.1 ± 1.7</td>
</tr>
</tbody>
</table>

The mean of ROM in maximum opening of jaw was within normal limits, since it is considered normal values above 40mm. However, in the 12.6% the value of this sample were below this threshold. Limitations in mandibular movement can be caused by muscle and structural adaptations, which, by reduction of muscle stretching, can affect jaw mobility. Mean ROM to the right and left were within the normal range, considered between 7 and 11mm. The mean ROM for protrusion and protrusion were considered normal, as were within the normal range of 0.3 to 4.2mm and 7 to 11mm, respectively6.

The mean overjet obtained was 3.1 ± 1.7mm, slightly increased since it is considered normal values between 1 to 2mm and increased to greater than 3mm. Pain on maximum mouth opening was present in 33% and for the lateral deviation in 13.6% of MB children. Pain on palpation of the masseter muscle was present in 24% and in palpation of the temporalis muscle in 12% of MB children, which is explained by some authors as due to the increase of the electrical activity of masseter and temporal muscles.

In our study, therefore, we found a high prevalence of symptoms of TMJ dysfunction in MB children, since the high occurrence of deviation on opening (91%), deviation in ICP (85%), deviation in protrusion (84%), and high prevalence of abnormal symptoms such as pain on mouth opening, clicking, crackles and pain on muscle palpation, with 18% of children had at least one of these abnormal symptoms.

CONCLUSION
According to our study, MB children have a high prevalence of symptoms of TMJ dysfunction, more research is needed to analyze the consequences caused by such changes.

REFERENCES
INTRODUCTION

Handwriting is a complex and dynamic activity of great importance in academic, working, recreational, financial, and legal activities. There are many pencil grasps for handwriting and those classified as mature are considered the most efficient and recommended by educators and therapists by using the intrinsic muscles of the hand, which demands less energy and less tension in the proximal region of the upper limb. People who do not meet this standard grip may have pain or degenerative diseases due to motor and biomechanical compensations in an attempt to achieve the best functional performance. The aim of this study is to analyze the prevalence of different pencil grasps for handwriting used by adults.

METHODS

Pilot study with 342 college students, right-handed, over 18 years, of both sexes and without functional impairment in upper limb or history of trauma or recent pain complaints. The writing activity was filmed while the volunteer filled out a form with personal details and contact information. The images were analyzed and grasps named according to the studies of Schneck & Henderson and Edwards, Buckland & McCoy-Powlen.

RESULTS AND DISCUSSION

Of the 342 subjects, 218 were female and 124 male. Subjects were asked only the personally identifiable information and materials (pen, paper and furniture) are of common use among students, minimizing the variables that could change the position and compensation for use of the upper limb. Filming allowed studying grasps several times and naming them safely. We found 10 pencil grasps for handwriting, and 155 subjects with dynamic tripod grasp, 16 with static tripod grasp, 87 with lateral tripod grasp, 1 with interdigital tripod grasp, 49 with dynamic quadrupod grasp, 4 with static quadrupod grasp, 3 with cross thumb grasp, 18 with locked grip with thumb wrap, 8 with locked grip with thumb tuck in with the index grip. Mature grasps (dynamic tripod, lateral tripod, interdigital tripod and dynamic quadrupod) were majority (n = 292), confirming previous studies. 50 subjects do not showed mature grasps and these were related to joint laxity.

CONCLUSION

This paper presents preliminary data on the prevalence of different pencil grasps used by adults at the activity of handwriting. It points out the need of studies that correlate pencil grasps for handwriting with the excessive use body’s structures and upper limb diseases favoring the prevention of injuries and occupational therapists’ clinical interventions.

REFERENCES


ACKNOWLEDGEMENTS

The authors thank the Coordination of Improvement of Higher Education Personnel - CAPES for granting the scholarship in Masters Program Graduate Occupational Therapy, Federal University of São Carlos. São Carlos, São Paulo, Brazil.
ANALYSIS OF THE STOMATOGNATHIC SYSTEM AFTER ANTERIOR CRUCIATE LIGAMENT PLASTY

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2 Claretian University Centre of Batatais – CLARETIANO
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INTRODUCTION

The Anterior Cruciate Ligament (ACL) plays a major role in maintaining knee joint stability and proprioception (Fatarelli et al., 2004). After the ACL injury, the muscle chains can undergo biomechanical changes throughout the system, promoting a reduction in the postural control that may influence the stomatognathic system (Howells et al., 2011).

This study aimed to analyze the effects on the performance of the stomatognathic system after six months following the ACL reconstruction.

METHODS

Forty men, aged between 23 to 29 years, were selected and divided into two groups: Group I comprised 20 healthy individuals with no postural change diagnosis; Group II, 20 individuals who had ACL surgical, unilateral with patellar tendon graft, paired individual to individual (age, weight, respiratory pattern). All of them were submitted to an electromyography in different clinical positions. In addition, a condylar biomechanical assessment was performed through videogrametry.

RESULTS AND DISCUSSION

In electromyography and kinemetrics, a normal standard biomechanical was observed for both groups, however, Group GII – Ligament plasty presented an inhibition of the masticatory muscles and decreased joint kinesthetic.

Howells et al (2011) stated that, after an anterior cruciate ligament plastys, it is possible to find moderate changes in posture due to the knee proprioceptive influence. Postural alignment and synchronicity are interconnected by visual stimuli, general bodily proprioceptive sensitivity and the vestibular apparatus. All these systems are interdependent from the harmony of other adjacent systems, among them, the stomatognathic system. This way, postural imbalances can cause alterations in the individual’s postural awareness (Roger, 1996).

Individuals with ligament injury showed a loss of knee function with a decrease of proprioception and sensitive mechanisms. When there is loss of ligaments, the individuals can exhibit changes in the joint position, an increase in time for passive motion detection, joint instabilities and reflex motor response of the ischiotibial muscles (Cuccia and Caradonna, 2009; Valeriani et al., 1999).

CONCLUSION

Results showed that the injuries and the ACL reconstruction surgery promoted generally changes in the stomatognathic system’s performance and in the individuals’ attitude. Health professionals should render more attention to the individuals as a whole, because the influence of anatomical trains is a reality.

REFERENCES


ACKNOWLEDGMENTS

Foundation support Scientific Research (2010/07513-5).
ANALYZE OF THE SIMETRIA POSTURAL IN STUDENTS OF NURSING

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INTRODUCTION

The bad alignments postural can be associated with the appearance of pathologies musculoskeletal once it can take the alteration of the corporal movements. A narrow relationship exists among the habits postural, the type of occupational activity and the alterations posturals1. There is a consensus of the physical overload exposed to the nurse and the importance of cares with the ergonomia2,3. A form of analyzing those professionals’ posture is through the photogrammetry, a valuable registration of the alterations postural along the time, because it is capable to register subtle transformations and to interrelate different parts of the body that are difficult of mensur4. Few works analyze the student’s of nursing in a quantitative way posture, being investigated that academic already begins the profession with alterations postural or if they are acquired along the years of profession. This study had for objective to investigate the students’ of Nursing of the Federal University of Privets posture, in 2011 of different periods to compare and possibly to verify asymmetries postural.

METHODS

The study is being accomplished the students of the course of Nursing of the Federal University of Privets close to - UNIFAL - MG. They were photographed 108 volunteer divided in two groups: Group 1 - 76 academics of the first to the fifth nursing period that you they didn’t still begin the clinical practice. Group 2 - 32 students of the eighth nursing period that exercised two years of clinical practice. All the participants sign the term of Free and Illustrious Consent. The study was approved by the Committee of Ethics in Research of UNIFAL-MG. The volunteer was photographed at positions anterior and posterior frontaland sagittal plane with swimsuit. The following anatomical points were demarcated with a label self-adhesive by a trained examiner: articulation acromioclavicular (AC), sternoclavicular (SC), inferior point of the scapula (IE), antero superior iliac spine (ASIS), postero superior iliac spine (PSIS), spines iliac future-inferior (EIPI). Then we carried out the photographic record with standardization of all volunteer, the camera and tripod described in literature5. The photographs were randomized and analyzed by a blinded examiner using the software ALCimagem. The analysis of symmetry with the software was performed by measuring angles from the markers attached to the skin, comparing the dimer left and right body of the subject.

RESULTS AND DISCUSSION

The volunteers of the group 1 presented medium age 21 years old ± 1.51, I weigh medium of 60.96Kg ± 10.59 and medium height of 1.64 ± 0.06 meters. The group 2 presented medium age 23.42 years old ± 7.07, weigh medium of 67.05 Kg ± 17.18 and medium height 1.67 ± 0.06 meters. The measures in degrees of the asymmetries are described in the table 1. Observed that the asymmetries presented by the nursing student before beginning the clinical practice is very similar the asymmetries presented by the student in the end of the university. For analysis of the asymmetries light asymmetry was considered, the differences up to 3 degrees among the right and left dimers of the body; moderate asymmetry among from 3 to 6 degrees asymmetry and above 6 degrees significant asymmetry (Table 2). The asymmetries more found were in the shoulder. As the nurse uses a lot in his her practice the superior members, it is important orientations and incentives of you practice of prolongations for that segment.

CONCLUSION

The clinical practice in the University no triggered larger incidence of asymmetries. The asymmetries were found mainly in the articulations of the shoulder (sternoclavicular and acromioclavicular). Orientations and incentives of prolongations involving the members superiors is important for that professional activity.

ACKNOWLEDGEMENTS

To CNPQ, UNIFAL-MG, all the volunteers that have been participating in that study.

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<table>
<thead>
<tr>
<th>Angles</th>
<th>Group 1 (n=76)</th>
<th>Group 2 (n=32)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC</td>
<td>6.07±5.23</td>
<td>3.8±3.38</td>
</tr>
<tr>
<td>AC</td>
<td>5.99±5.48</td>
<td>5.29±5.98</td>
</tr>
<tr>
<td>IS</td>
<td>2.43±1.92</td>
<td>2.46±1.68</td>
</tr>
<tr>
<td>ASIS</td>
<td>3.93±4.20</td>
<td>1.72±2.31</td>
</tr>
<tr>
<td>PSIS</td>
<td>2.95±3.09</td>
<td>2.32±2.44</td>
</tr>
<tr>
<td>∆TL</td>
<td>15.99±5.64</td>
<td>17.54±8.77</td>
</tr>
<tr>
<td>∆TR</td>
<td>15.54±6.4</td>
<td>18.05±9.39</td>
</tr>
</tbody>
</table>

| Table 1: Means and standard deviations of the groups analyzed, where SC refers to the angle of the sternoclavicular joint, AC, the angle of the acromioclavicular, IE, Inferior angle of the board of the scapula, ASIS, anterior superior iliac spine, PSIS posterior superior iliac spine; ∆TE, Tales triangle left and ∆TE, Tales triangle right. |

<table>
<thead>
<tr>
<th>Light</th>
<th>Group 1 Moderate</th>
<th>Significant</th>
<th>Light</th>
<th>Group 2 Moderate</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC</td>
<td>20</td>
<td>17</td>
<td>13</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>AC</td>
<td>32</td>
<td>22</td>
<td>28</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>IS</td>
<td>50</td>
<td>21</td>
<td>4</td>
<td>27</td>
<td>8</td>
</tr>
<tr>
<td>ASIS</td>
<td>47</td>
<td>19</td>
<td>6</td>
<td>28</td>
<td>4</td>
</tr>
<tr>
<td>PSIS</td>
<td>44</td>
<td>17</td>
<td>11</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td>∆T</td>
<td>40</td>
<td>27</td>
<td>6</td>
<td>11</td>
<td>6</td>
</tr>
</tbody>
</table>

| Table 2 - Table 1: Percentage of students who have asymmetries |

Braz J Oral Sci. 11(2):158-347
INTRODUCTION

Individuals with spinal cord injury can have permanent postural imbalance in relation to the musculoskeletal system, a fact that contributes to the emergence of problems of the upper body (Ribas, 1997). Surface electromyography as well as being a complementary test to study anatomical, physiological and neurophysiological the musculoskeletal system is easy to use and produces no discomfort to the individual (Pancherz, 1980, Ferrario et al., 2002). The objective of this study was to analyze, by means of surface electromyography, the stomatognathic system in individuals with paraplegia practitioners and not practitioners of sports.

METHODS

Twenty male subjects divided into three groups: G1: 05 paraplegic practitioners of athletics with a mean age of 31 years, G2: 05 paraplegics not physically active mean age 30 years and G3: 10 patients without neuromotor non-practicing sports, with a mean age of 32 years, submitted to electromyographic evaluation of right and left temporal muscles (RT and LT), right and left masseter (RM and LM), right and left sternocleidomastoid (RS and LS) in the clinical condition of Habitual Masticatory Efficiency Peanuts (HMEP) and raisins (HMER). For data collection, were used the EMG brand Myosystem-Br1, twelve channels and for data analysis were used the ANOVA test (SPSS version 17.0). This study was approved by the Ethics in Research, Case No. 13/2010 CEP.

RESULTS AND DISCUSSION

In HMEP clinical condition, there was greater activation of the muscles RM and LM for all groups, but also large muscle activation, RS and LS. In HMER clinical condition, it was for the G3, the balance between the activities of muscles and LM, RM and RT and LT, which was not observed for G1 and G2. The results showed that only the RT and LT muscles in the clinical condition of HMER presented significantly difference (ANOVA p<0.05) (Table 1).

During any change in information from the occlusion, the temporomandibular joints or masticatory muscles can affect the pattern of movements and masticatory efficiency (Okeson, 2000; Kim et al., 2001). The results showed that there was a pattern of masticatory impairment, mainly related to RT and LT between the groups.

CONCLUSION

Individuals with paraplegia showed a deficit of the stomatognathic system.

REFERENCES


ACKNOWLEDGMENT

Research Foundation of Sao Paulo State (Process- 2010 07507-5).
INTRODUCTION

The exercises Pilates Method (PM) challenge the stability of the trunk and activate the deep muscles of the lumbopelvic region (Endelman, Critchley, 2008). It is suggested that the most widely used mechanism for the maintenance of spinal stability is the coactivation of trunk muscles. There is a structural, histological and functional differentiation of the trunk muscles that can be divided into local, multifidus (MU) and oblique internus (OI) and global muscles, rectus abdominis (RA) and iliocostalis lumorum (IL). Given the wide application of the PM and the lack of scientific and clinical basis about the action of the muscles stabilizing the spine during the execution of the exercises, the aim of this study was to compare the antagonist coactivation local and global muscles of the trunk during five exercises of the PM.

METHODS

Twelve young women (ages 20.05±2.5, physical activity level (hours/week) 5.54±1.91 without experience in the practice of PM were evaluated. They performed five exercises of PM including, Hundreds level I (HU I), Hundreds level II (HU II), One Leg Stretch level I (OLS I), One Leg Stretch level II (OLS II) and Scissors level I, in random order. Concurrently, surface EMG from local (OI and MU) and global (RA and IL) muscles was recorded for each side of the body, by telemetry Myoresearch Electromyograph (Noraxon®,Arizona/USA) of channels eight and with Myoresearch software (Noraxon®), with a sampling frequency of 2000 Hz and a total gain of 2000 times. Was used Ag/AgCl surface electrodes (Miotec®), placed in bipolar configurations, with a recording area of 1 cm in diameter and interelectrode distance of 2 cm. Prior to electrode placement, the skin was shaved and cleaned with alcohol to reduce resistance. The electrodes were placed bilaterally on the muscles: IO, MU, RA, IL. A reference electrode was positioned over the styloid process of the ulna on the right arm (Marques et al, 2012). EMG signal analysis was carried out using specific software developed in Matlab (Mathworks® 7.0 Natick, USA) this being rectified (full wave) and smoothed (low pass filter of 4th order with a cutoff frequency of 10 Hz). From this, was calculated the percentage of antagonist coactivation between local muscles (OI/MU) and global muscles (RA/IL) bilaterally. For this calculation, was used the formula proposed by Winter (1995). To compare the percentage coactivation between local and global muscles in the five exercises analyzed by ANOVA test to repeated measures and post hoc LSD. Was used too t-Student test to comparison between the local and global antagonist coactivation in each exercise, considering significant p<0.05.

RESULTS AND DISCUSSION

To the right side, there was difference about the antagonist coactivation between the exercises (p=0.002) and between the local and global antagonist coactivation (p=0.001). To the left side, there was a difference only among the percentage coactivation between local (OI/MU) and global (RA/IL) antagonist muscles (p=0.001). In contrast with study of Souza, Baker e Power (2001) that didn’t find difference between the sides right and left during exercises of stabilization of the spine. The asymmetric application of the load by gravity of the lower limbs during performance of the exercise generates perturbation unilateral of the trunk and rotation movements which may have led to higher antagonist coactivation muscle on the riht side, also considering the fact that all voluntary were characterized right-handed. To the right side, the exercise HU I had higher antagonist coactivation than OLS I (p=0.057) and the SC I (p=0.013). The HU II had higher antagonist coactivation than OLS II (p=0.058) and the SC I (p=0.011). These exercises are considered initial in the training for challenging the fundamental Centered principle of the PM. It can be observed a higher percentage of antagonist coactivation of the local muscles in these exercises, which may possibly explain the greater antagonist coactivation. This study found that on both sides of the body, antagonist coactivation of the global muscles (RA/IL) was higher in all exercises analyzed. The global muscles of the trunk as RA and IL play a important role in maintaining the stability of the column and in generating the torque required to move the trunk and limbs. During the execution of exercises OLS I and II and SC I, was held on alternating movement of the lower limbs in closed kinetic chain (OLS I) and open kinetic chain (OLS II and SC I). There is a relationship with increasing antagonist coactivation of the trunk muscles and the asymmetric load applied and the distance of movement of the lever arm. Global muscles are fundamental pelvic stability during exercises with knee extension and also to control the torque generated by hip extension. Thus, it can be inferred that besides the need to maintain spinal stability and the neutral position of the lumbar spine, the highest global antagonist coactivation of the trunk muscles was necessary for the production of torque, dynamic alteration and long lever arm of the lower limb movements (Hodges, 2003).

CONCLUSION

Individuals new to the practice of PM showed higher global coactivation during the exercises. Thus, in clinical practice, the physiotherapist should be aware of compensation and overload of the exercises to prevent excessive load on the structures of the lumbar region.

REFERENCES

INTRODUCTION

Mastication is a neurophysiological action defined as the act of comminuting food through the exposure to occlusal surfaces (Van den Braber W et al, 2001). However, the alteration of occlusal pattern, contact area, number of teeth or number of occlusal pairs can decrease the masticatory capacity (Sierpinska T et al, 2006). Another factor that may modify the masticatory process is the presence of Temporomandibular Disorder (TMD), a collective term enhancing signs and symptoms that affect the masticatory muscles, the temporomandibular joint and associated structures. TMD can cause general alterations in mandibular movements and consequent demages of stomatognathic functions (Bianchini, 2008).

Surface electromyography (EMG) is a noninvasive technique used to assess the function and dysfunction of the masticatory muscles by assessing the electrical activity in a muscle (Dahlström, 1989) and establish the parameters of neuromuscular activity in mastication, in normal and pathological conditions. The purpose of this study was to compare the active period duration (ON) during bilateral mastication in anterior Temporal and Masseter muscles between subjects Class I without TMD and subjects Class I, II and III with TMD.

METHODS

The study included 40 volunteers, age 18–36 years, assigned to four groups: class I without TMD (control, n=10), class I with TMD (group A, n=10), class II with TMD (group B, n=10) and class III with TMD (group C, n=10).

All subjects signed an informed consent form after the clarification of goals and procedures of the research. The study was approved by the Ethics Committee on Research of Piracicaba Dental School - FOP / UNICAMP.

Research Diagnostic Criteria (RDC) were used to diagnose and classify TMD regarding physical (axis I) and psychological factors (depression and somatization; axis II).

The electromyographic activity was recorded by a signal acquisition module (MyosystemBr1). The reference electrode with conductive gel, disc-shaped, was placed near the ulnæ styloïd process, and the differential active when taped to the masseter and anterior temporalis muscles, on both sites, before cleaned with gauze and alcohol.

The volunteers were instructed to perform the bilateral mastication for three consecutive trials of 5 seconds, separated by an interval of 3 minutes between them.

RESULTS AND DISCUSSION

It was applied Student-test t obtained from two independent samples. The level of significance (p) was 5%. The active ON was analyzed by the software Matlab 10.0

Table 01 shows that control group exhibited lower ON for all muscles comparing to groups A and B and, larger, when compared to group C. There is strong evidence (p<0.05) that control ON is significantly lower comparing to group B ON and significantly larger than group C ON.

According to Chong-Shan et al. (1982), patients with dysfunction may exhibit an increase in contraction period of temporal and masseter muscles. Inversely, according to Manss (1987), TMD can lead the subject to select less texture and consistence food, which would lead to a neuromuscular reprogramming and then, shorter muscle contraction period. However, according to Ahlgreen (1982) different kinds of occlusion and food can also influence masticatory movements. Proschel and Hofmann (1988) also emphasize the influence of occlusal pattern and the opening and closing anatomical differences in masticatory movement pattern. Based on this premise, it is supposed that TMD associated to a particular occlusal pattern may cause a value ON variation according to the different occlusal kinds.

CONCLUSION

The anterior Temporal and Masseter muscles active period duration during bilateral mastication may be affected by TMD and malocclusion patterns.

Table 1: ON values in milliseconds (ms) between groups Control, group A, group B and group C.

<table>
<thead>
<tr>
<th></th>
<th>Left Temporal</th>
<th>Right Temporal</th>
<th>Left Masseter</th>
<th>Right Masseter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>9.54</td>
<td>9.79</td>
<td>9.61</td>
<td>9.48</td>
</tr>
<tr>
<td>group A</td>
<td>9.56</td>
<td>9.81</td>
<td>9.63</td>
<td>9.70</td>
</tr>
<tr>
<td>group B</td>
<td>9.70</td>
<td>9.85</td>
<td>9.79</td>
<td>9.79</td>
</tr>
<tr>
<td>group C</td>
<td>3.82</td>
<td>3.87</td>
<td>4.95</td>
<td>4.08</td>
</tr>
</tbody>
</table>

* significant to 5%; ns = not significant

REFERENCES

AQUATIC THERAPY INTERFERENCE IN THE BALANCE OF CHILDREN WITH CEREBRAL PALSY

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INTRODUCTION

Cerebral Palsy (CP) describes a group of permanent disorders of development of movement and posture, causing activity limitation, that are attributed to nonprogressive disturbances that occurred in the developing fetal or infant brain. The effects of aquatic therapy on balance are shown in some researches but there are no specific evidences of aquatic therapy interference in functional activities, justifying the development of a study with this purpose. The aim of this study is to verify the interference of aquatic therapy on balance of children with CP.

METHODS

This is a controlled trial study, nonrandomized, longitudinal, descriptive and analytical, quantitative. The study sample consisted of patients who were undergoing treatment in Association for the Care of Disabled Children. 560 records were analyzed and identified those which filled inclusion criteria, that were: children with spastic diparesis type who were classified as level II on the GMFCS, both genders, ages between 5 and 8 years; without physical therapy treatment. The final sample consisted of 15 children.

The selected children were analyzed before and after the study by three physical therapists. For evaluation it was used Functional Balance Scale Berg, Dynamic Gait Index (DGI), Timed Up An Go (TUG) and Surface Electromyography (EMG) on tibialis anterior and medial and lateral gastrocnemius in three items of Berg Scale (Seated to standing, Standing without support and Standing to sitting), following the recommendations of SENIAM. A four-channel Miotec® surface EMG with precoated Kendall 200® Ag/AgCl circular electrodes was used to measure muscle recruitment. It was used a Miotool 400 USB model EMG and the Miograph® program was used to acquire and analyze the signal. After evaluation children were divided non-randomly into two groups: experimental group (EG) and control group (CG). The CG remained for 8 weeks without any therapy and the EG underwent aquatic protocol developed by the authors of the study. Each child performed 16 individual sessions, with 35 minutes duration, two times per week for 8 weeks. The Wilcoxon signed-rank test was used to compare pre and post intervention in each group, and the Mann Whitney test was used to compare the control and experimental group. The significance level was set at p<0.05 for all comparisons.

RESULTS AND DISCUSSION

The experimental group consisted of 10 children, 50% female and 50% male, with mean age of 6.2 years ± 0.91. The control group consisted of 5 children, 20% female and 80% male, with mean age of 7.0 years ± 0.70. It was found that only EG showed statistically significant improvement when comparing pre e post intervention values obtained in Berg Scale, DGI and TUG.

In Berg Scale the mean found in pre intervention was 37.7 in EG and 48.6 in CG. In the post intervention the mean found in EG was 47.9 and 48.2 in CG. The mean values obtained in DGI was 12.4 for EG and 18 for CG before intervention. And after intervention the mean was 17.9 in EG and 18.2 in GC.

It was found in EG greater activation in tibialis anterior and gastrocnemius in both legs during Berg Scale item “Seated to standing position”. In the item “Standing to sitting position” it was found greater activation in right gastrocnemius and in tibialis anterior of both legs.

During the activity “Standing without support” the tibialis anterior activation decreased after intervention in EG, and in CG the muscle activation improved. With respect to gastrocnemius were observed only minor modifications. It is important to remember that only some of the values found by EMG were statistically significant in both groups.

In the present study the EG improved after intervention in Berg Scale and TUG. Gan found that BERG and TUG are simple functional balance measures, valid and reliable for examining children with CP, and therefore suitable for clinical practice.

In one research after application of aquatic therapy protocol in a child with CP there was improvement in the ability to go up and down stairs, in gait performance and balance. In the present study it was observed similar gains, because one of the items of DGI is to go up and down stairs, and the EG improved in this item and in all DGI scale, with statistically significant values.

The task demands and environment characteristics stimulate adaptation and creation of interaction strategies, interfering in learning and improvement of psychomotor aspects. In the present research during the application of Berg Scale in the items “Seated to standing” and “Standing to sitting”, we observed increased activation of tibialis anterior after intervention, in the EG. And in the CG it was observed less activation. This may have occurred because during the protocol dorsiflexion has been constantly repeated, thus promoting improved ankle strategy, with consequent balance improvement.

Another item analyzed was “Standing without support”, and it was found decreased activation of tibialis anterior and some variations of gastrocnemius when comparing pre and post intervention, in the EG. This fact suggests that there was improvement in balance, represented by less postural oscillation.

CONCLUSION

For this sample aquatic therapy was effective in balance rehabilitation, resulting in greater activation of tibialis anterior and gastrocnemius in transfers from seated to standing position and standing to sitting; and decreased muscle activation when standing without support, with consequent improvement in speed and change in gait performance in certain tasks.

REFERENCES

ARE THE RATE OF TORQUE DEVELOPMENT AND THE RATE OF NEUROMUSCULAR ACTIVATION PREDICTORS OF THE RISK OF FALLS IN ELDERLY?

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INTRODUCTION
Fall is considered the main cause of injury in the elderly, being responsible for 90% of hip fractures, and represents 45% of cases of death in these individuals. In this sense, the musculoskeletal ability to develop strength quickly during a postural disturbance has been reported as a mechanism to prevent falls (Bento et al., 2010). Thus, given importance of rapid control of the combination body movements and balance for functional mobility, the rate of force development (RFD) and the rate of activation neuromuscular (TAN) have been identified as important indicators of risk of falls in elderly (LaRoche et al., 2010). Therefore, the aim of this study was to compare parameters of TAN and RFD of the stabilizing muscles of the hip among fallers (EF) and non fallers (ENF) elderly.

METHODS
We evaluated 43 physically active women, divided into two groups: 20 EF (mass=65.6±10.2 kg; age=68.8±6.6 years; height=1.52±0.05 m) and 23 ENF (mass=62.6±10.7 kg; age=66.5±6.2 anos; height=1.51±0.05 m), based on their report of having fallen or not fallen during a period of one year before the study. This study was approved by the local research ethics committee (N° 69/2009).

Previously to dynamometric assessment, the subjects performed 5 min of preparation on treadmill Millennium Super ATL (INBRAMED®), walking at preferred speed. Then, they were positioned on the isotonic dynamometer System 4 PRO (Biodex®) and familiarized with the equipment. The evaluation protocol consisted of three maximal voluntary isometric contractions (MVIC) maintained for 5 s with an interval of 30 s between contractions, to the flexion/extension of the hip. Electromyographic (EMG) signals were collected synchronously to the dynamometric signals, by the system Telemyo 900 (Noraxon ®) and software Myoresearch (Noraxon ®) at a sampling frequency of 2000 Hz and a gain of 2000 times. Surface electrodes, bipolar Ag/AgCl (Miotec ®), with an active area of 1 cm2 and fixed-inter electrode distance of 2 cm, were positioned on the rectus femoris (RF) and gluteus medius (GM) as recommended by SENIAM (Hermens et al., 1999). Previously to placement of the electrodes, the skin was shaved and cleaned with alcohol. The torque signals were processed using the 4th order filter 6 Hz. The RFD was determined by variation the torque variation divided by the corresponding time variation, using window of 100 samples. The calculation started from the sample 100 to sample 1, followed by sample 101-2, 102-3, etc. We analyzed RFD peak and the RFD values recorded in the 50, 100 and 200 ms from the beginning of the production of torque, which were normalized by body mass.

For the calculation of the TAN, the EMG signal of the RF and GM was rectified by a full wave and smoothed by low pass filter of 4th order with a cutoff frequency of 50 Hz. TAN was obtained by the EMG activity variation divided by time variation, based on muscle onset until the subsequent 75 ms (Aagaard et al., 2002). The TAN was normalized by the maximum activation during MVIC for each muscle and voluntary analyzed. After verification of the data distribution using the Shapiro Wilk test, we used the Mann Whitney test for the comparison between the EF and ENF (P ≤ 0.05).

RESULTS AND DISCUSSION
EF showed lower RFD for all hip movements analyzed: flexion (50 ms), extension (50, 100 and 200 ms) than ENF. EF also showed lower values for the TAN of the RF muscle during hip flexion (Table 1).

The physiological factors that may influence the RFD include maximum muscle strength and intrinsic muscle properties. It is suggested that in the early phases of contraction (<40 ms), the intrinsic muscle properties are more related with changes in the RFD, but in later time intervals (> 90 ms), the RFD increases strongly the relation with to muscle strength maximum (Aagaard et al., 2002). Thus, it can be inferred that EF present alterations both related to the pattern of recruitment of motor units, as well as to changes in the muscle structure. However, during hip flexion can be concluded that changes in RFD are mainly due to the recruitment pattern of motor units. The extensor muscles are responsible for driving the body up and forward, which may explain the greater involvement of RFD in this muscle group in EF. On the other hand, the lower TAN for muscle RF in EF may also to represent a risk of falls because it reflects an ability to slow muscle activation. Thus, the impaired function of these muscle groups can lead to biomechanical changes during mobility and increase the risk of falls.

CONCLUSION
EF presented impairment of RFD in the hip joint, which can be explained by changes in the production of maximum muscle strength and intrinsic muscle contractile factors. In this sense, the deficiencies in the RFD and TAN identified in this study are indicative of the risk of falls in the elderly and may contribute to the orientation of intervention strategies in this population.

REFERENCES

ACKNOWLEDGEMENTS
FAPESP (Processo 2010/10886-8); CNPq (Processo 557966/2009-4); FUNDUNESP (Processo 0125610).

Table 1. RFD (Nm.s-1kg-1) minimum (min), maximum (max) and median (med) in 50, 100 and 200 ms and TAN (% CIVM.s-1) in 75 ms, from beginning of contraction.

<table>
<thead>
<tr>
<th></th>
<th>Elderly Fallers (n=20)</th>
<th>Elderly Non Fallers (n=23)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min</td>
<td>Med</td>
</tr>
<tr>
<td>RFD 50</td>
<td>21.35</td>
<td>49.41</td>
</tr>
<tr>
<td>RFD 100</td>
<td>15.29</td>
<td>47.25</td>
</tr>
<tr>
<td>RFD 200</td>
<td>17.32</td>
<td>38.31</td>
</tr>
</tbody>
</table>

* Significant difference between elderly fallers and non-fallers groups (P ≤ 0.05)
ASSOCIATION OF MOVEMENT AND WORK BALANCING OF THE MANDIBULAR CONDYLE IN USUAL AND NOT USUAL MASTICATORY CYCLE IN PARAPLEGICS

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INTRODUCTION

Sport for individuals with special needs provides an opportunity to test the limits and potential, to prevent secondary deformities and promote social integration. Currently the human anatomy, has been concerned with the integration of clinical anatomy, understanding of specific body systems and the adequacy of an accurate diagnosis (Verissimo; Rosicler, 2006). Individuals with paraplegia imbalances present posture of the mandible and the adequacy of an accurate diagnosis (Verissimo; Rosicler, 2006). The professional and dental surgeons for a good assessment in cases of maxillo-respiration. Thus it is important to the integration of the physical therapy and may have possible effects on chewing, swallowing, phonation and respiration. It is thus important to the integration of the physical therapy professional and dental surgeons for a good assessment in cases of maxillo-facial disorders, associated with postural changes (Gomes, 2005). The objective is to diagnose possible dysfunctional movements of balancing work of jaw during the usual and unusual chewing cycle.

METHODS

Twenty male subjects were divided into three groups: G1: 05 paraplegic athletics practitioner with mean age 31 year, G2: 05 paraplegic patients who do not practice physical activities with an average age of 30 years and G3: 10 individuals without neuromotor impairment with a mean age of 32 years. They were underwent kinemetric evaluation considering the mandibular axis (MA), the Right hemiface (RH) and Left hemiface (LH) in the clinical conditions of Habitual Masticatory Efficiency of Peanuts (HMEP), Raisins (HMER) and Non-Habitual Chewing of Parafilm (NHCP). For data collection, specific points were demarcated: the chin process, zygomatic bone and bring ear. For data analysis we used the ANOVA test (SPSS version 17.0). This study was approved by the Research Ethics Committee Case No 13/2010.

RESULTS AND DISCUSSION

For the clinical condition HMEP and HMER, the results were not statistically significant for any hemifaces (RH and LH). In the clinical condition NHCP there is a significant difference being that for the G1, the values were, 131.66 ± 2.38 (RH), 153.56 ± 4.41 (LH), for G2 133.87 ± 4.42 (RH) and 140.04 ± 6.00 (LH) and G3 135.59 ± 2.84 (RH) and 134.84 ± 3.51 (LH) (ANOVA p <0.05) (Table 01). Thus the results indicate that in chewing hard food (peanuts) observed similarity of the chewing pattern unusual for all groups. Soft food during chewing (Raisins) showed low levels of functional requirement in grinding the food, and for all groups observed shift to the left mandible and maxilla to the right. Chewing is a complex, sophisticated and essential that occurs by neurophysiological and motor action, with the interaction of receptors, nerves that act on muscles and bones around the stomatognathic system (Gallo et al., 2006). The usual chewing pattern, natural, non-oriented, typically effected by normal and natural teeth, is to switch the working side, and is responsible for the fragmentation of the food teeth, mandible movements by means of cyclical opening and closing cycles known mastication, which provides the sum of the food to reduce a size and shape suitable to allow by means of successive swallows, consume it fully (Slater, 1979). The description of the pattern of cyclical movement of the masticatory system are consistent with data found in this study, showing indices of functional changes of the system.

CONCLUSION

The results of this study meets the clinical observation that there was a prevalence of alterations in the biomechanics of chewing cycles, as evidenced by the displacement of the mandible to the left side of the maxilla and to the right side.

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ACKNOWLEDGMENTS

Research Foundation of São Paulo State (Process- 2010 07507-5).

Table 1: Averages computed kinemetric in clinical conditions Habitual Masticatory Efficiency of Peanuts, Habitual Masticatory Efficiency of Raisins and Non-habitual chewing of parafilm.

<table>
<thead>
<tr>
<th>Clinical Condition</th>
<th>Groups</th>
<th>Hemifaces</th>
<th>Sig.</th>
<th>Means</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habitual Masticatory Efficiency of Peanuts</td>
<td>G1</td>
<td>Right</td>
<td></td>
<td>138.47</td>
<td>± 8.22</td>
</tr>
<tr>
<td></td>
<td>G2</td>
<td>Right</td>
<td>0.38ns</td>
<td>138.15</td>
<td>± 3.83</td>
</tr>
<tr>
<td></td>
<td>G3</td>
<td>Left</td>
<td></td>
<td>131.05</td>
<td>± 1.09</td>
</tr>
<tr>
<td>Habitual Masticatory Efficiency of Raisins</td>
<td>G1</td>
<td>Left</td>
<td>0.33ns</td>
<td>145.54</td>
<td>± 3.08</td>
</tr>
<tr>
<td></td>
<td>G2</td>
<td>Left</td>
<td>0.33ns</td>
<td>136.64</td>
<td>± 7.23</td>
</tr>
<tr>
<td></td>
<td>G3</td>
<td>Left</td>
<td></td>
<td>140.40</td>
<td>± 3.89</td>
</tr>
<tr>
<td></td>
<td>G1</td>
<td>Right</td>
<td>0.44ns</td>
<td>136.78</td>
<td>± 8.52</td>
</tr>
<tr>
<td>Non-habitual chewing of parafilm</td>
<td>G2</td>
<td>Left</td>
<td>0.06ns</td>
<td>137.10</td>
<td>± 7.58</td>
</tr>
<tr>
<td></td>
<td>G3</td>
<td>Left</td>
<td></td>
<td>142.34</td>
<td>± 3.85</td>
</tr>
<tr>
<td></td>
<td>G1</td>
<td>Right</td>
<td></td>
<td>131.66</td>
<td>± 2.38</td>
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<tr>
<td></td>
<td>G2</td>
<td>Right</td>
<td>0.70ns</td>
<td>133.87</td>
<td>± 4.42</td>
</tr>
<tr>
<td></td>
<td>G3</td>
<td>Right</td>
<td></td>
<td>135.59</td>
<td>± 2.84</td>
</tr>
<tr>
<td></td>
<td>G1</td>
<td>Left</td>
<td></td>
<td>153.56</td>
<td>± 4.41</td>
</tr>
<tr>
<td></td>
<td>G2</td>
<td>Left</td>
<td>0.02ns</td>
<td>140.04</td>
<td>± 6.00</td>
</tr>
<tr>
<td></td>
<td>G3</td>
<td>Left</td>
<td></td>
<td>134.84</td>
<td>± 3.51</td>
</tr>
</tbody>
</table>

* Significance at p< 0.05
** Not significant
ASSOCIATION BETWEEN ANXIETY / DEPRESSION AND MUSCLE ACTIVATION IN PATIENTS WITH TMD

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INTRODUCTION

Temporomandibular disorders (TMD) represent a group of painful conditions involving the muscles of mastication and the temporomandibular joint (TMJ).

A study1 performed in 2000 demonstrated that electromyographic activity (EMG) of the jaw muscles during rest is increased when compared with healthy subjects, suggesting hypertonia of those muscles.

In a study2 published in 1993, Lipton et al suggested that psychosocial factors as depression, stress and anxiety play an important role in the predisposition, initiation, and perpetuation of TMD. They are also important in the response of TMD patients to the treatment because the psychological pressure would cause a constant isometric activity on the jaw muscles, which will have hyperactivity particularly the temporalis and masseter muscles.

Considering that college students are exposed to stress, anxiety and depression, and that they are in the most prevalent age of TMD (20 to 45 years), the aim of this project was to evaluate the association between anxiety/depression levels and the EMG of the jaw muscles in patients with TMD.

METHODS

Sixteen college students with TMD took part in this study (15 women and 1 man, mean age of 20.66±1.59 years). They were diagnosed with myogenic (n=4), arthrogenic (n=4) and mixed (n=8) TMD. In order to be included in the study the subjects had to be classified a TMD patient with severe or moderate level, according to the Índice Anamnésico de Fonseca and have the diagnosis confirmed by the RDC/TMD (research diagnostic criteria for temporomandibular disorders). If the diagnosis was confirmed, the subject was excluded.

First of all, the subjects answered the Hospital Anxiety and Depression Scale (HADS) to measure their level of anxiety and depression. The EMG examination was performed to record the masseter and temporalis muscles activation during chewing of a piece of parafilm in the affected side.

The signal was normalized by the peak obtained in three maximal voluntary contractions (MCV), performed with a cylinder of cotton between the teeth. Active single differential surface electrodes (Model #DE-2.1, Delsys®, Boston, USA) with a detection geometry consisting of two parallel silver bars (1 mm2 x 1 cm) separated by 1 cm were attached to the skin using a double-sided interface. The reference electrode was placed on the sternal notch.

The signals were conditioned by the main amplifier (Bagnoli-8 EMG System, Delsys®), which provided a gain of 1000V/V, bandwidth 20–450 Hz and noise of 1.2 μV (RMS). The data were sampled at a rate of 2000 Hz using a PC workstation with a 16-bit A/D card (PCI-6034E, National Instruments) All signals were band-pass filtered using a fourth-order zero-lag Butterworth filter at 20–400 Hz. They were converted into RMS using windows of 20 ms and 50% overlapping. Data were then normalized for further calculation of the mean RMS of each muscle, as well as the intensity and duration of activation represented by the area and the duration of the contraction period.

All data were tested for normality through Shapiro Wilk’s test. Correlation analysis was conducted using the Pearson’s or the Spearman’s correlation coefficient. All analysis were performed using STATISTICA software, considering α = 0.05.

RESULTS AND DISCUSSION

The subjects had a score of 10.94 (± 6.49) on the HADS (which ranges from 0 to 42 points). The EMG variables recorded during mastication are shown in Table 1, as well as the results of the correlation tests between these variables and the level of anxiety/depression recorded by the HADS. Statistical analysis showed no association between the level of anxiety/depression of the subjects and muscle activation pattern (Table 1).

<table>
<thead>
<tr>
<th></th>
<th>Mean (±SD)</th>
<th>r</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affected temporalis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>anterior</td>
<td>Mean activation (%MVC)</td>
<td>0.41 (0.19)</td>
<td>0.009</td>
</tr>
<tr>
<td>Area activation (%MVC*)</td>
<td>4.63 (1.04)</td>
<td>0.173</td>
<td>0.522</td>
</tr>
<tr>
<td>Time activation (s)</td>
<td>12.22 (3.33)</td>
<td>0.106</td>
<td>0.696</td>
</tr>
<tr>
<td>Mean activation (%MVC)</td>
<td>0.34 (0.12)</td>
<td>0.096</td>
<td>0.723</td>
</tr>
<tr>
<td>Affected masseter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area activation (%MVC*)</td>
<td>4.47 (1.23)</td>
<td>0.411</td>
<td>0.114</td>
</tr>
<tr>
<td>Time activation (s)</td>
<td>14.00 (3.77)</td>
<td>0.239</td>
<td>0.373</td>
</tr>
</tbody>
</table>

Our results showed no association between anxiety/depression and the activation pattern of the masticatory muscles in TMD patients. Based on the literature, we expected an association between those variables. Psychosocial factors are related to the development of the TMD’s2 and increase the activation of the masticatory muscles. Our results may suggest that not all the evaluated subjects had considerable level of anxiety/depression to be classified as a case, since normative data indicate cases when HADS score is higher than 10 points. The results showed a typical muscle activation pattern of patients with TMD. In these subjects, there is a low activation of the masseter muscle in relation to the temporalis during chewing, especially on the affected side. It seems that this is a specific mechanism of joint protection, resulting in a central inhibition modulated by nociceptors of the TMJ.

It is important to emphasize the fact that signals were normalized by MVC. Thus, an increased activation in this contraction may have masked the results of this study.

CONCLUSION

The results of this study indicate no association between low levels of anxiety/depression and masticatory muscle activation in individuals with TMD. Further studies should consider higher levels of anxiety/depression to assess the association between these factors and to propose new methodologies to normalize EMG signals.

REFERENCES


ACKNOWLEDGMENTS

Authors are grateful to FAPESP, for the financial support (Proc. N. 2010/15872-5).
AURICULOTHERAPY IN THE MANAGEMENT OF BRUXISM - CASE REPORT

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INTRODUCTION
The habit of press and creak the teeth or is the representation of a behavior known as parafunctional bruxism. Diabetes Mellitus (DM) type II is a chronic disorder in which hyperglycemia occurs with impaired glucose metabolism. Auriculotherapy is a technique of Chinese Traditional Medicine, a branch of acupuncture which uses the ear to treat diseases. The objective of this study was to evaluate the effect of the auriculotherapy in the electric sign of the muscular fiber in rest from the auricular muscle fiber at rest in a patient with bruxism and type II DM.

METHODS
Patient AC, female, 48, 78kg, attended the Acupuncture Clinic of the Piracicaba Dental School/UNICAMP, with the main complaint of teeth clenching, emotional stress, anxiety, diagnosed with type II diabetes mellitus for 6 years, without medication and no vascular changes. The patient was auriculotherapy every Friday for three months, using mustard seeds set in the ear with the help of tape beige brand Cremer. The patient was advised to encourage the places where the seeds were set, three times a day (morning, afternoon and night), being removed after four days. Used ear points: Shen-Men, Kidney, Endocrine, Heart, Gall Bladder, Spleen and Vagus Nerve.

The patient was evaluated before and after auriculotherapy treatment to verify and compare the electromyography activity of anterior temporal and masseter muscles bilaterally in the rest moment. Data where collected on the device Lynx Electronics Ltda 8-Channel, with disposable surface electrodes.

We followed the international standards recommended by ISEK and SENIAM.

To observe the effects of auriculotherapy in blood sugar tests were performed using capillary blood glucose system One Touch Ultra 2 (Johnson & Johnson Medical), with serial measurements of blood glucose weekly after 8 hours of fasting and weekly control weight.

RESULTS AND DISCUSSION

Through the electromyographic evaluation at rest (Figure 1), when comparing the RMS pre-and post-treatment with auriculotherapy, there was decrease in the RMS.

The patient reported significant improvement in the perception of press and creak the teeth.

There was a reduction in blood sugar, and the initial rate of 172 mg/dl and the end of 116 mg/dl, value considerable acceptable and satisfactory glycemic control.

In relation to the body weigh was observed to reduce when comparing the initial and final weigh (after treatment).

In accordance with the Traditional Chinese Medicine, diagnosis and treatment of pathologies are based on an integrative analysis, with the differentiation of signs and symptoms, including the nature and cause of the disease and the physical and emotional condition of the patient, thus the benefit of therapy is extended to the whole body, as here, where there was a reduction in awareness of bruxism, and the weight reduction rate and glucose.

The therapy utilizes the atrial or auricular pinna based on the fact that the ear is the correspondence of each part of the body organ and / or viscera, and in the presence of a disease, a reflex response appears in the region corresponding to the injured organ (auricular point), to be stimulated is a form of treatment.

In this clinical case the selection of ear points was in accordance with amendments submitted by the patient, depending on the specific indications for each point and its association to other points in order to potentiate their effects.

When stimulated points Shen-Men, Heart and Kidney was possible to balance the emotional (anxiety and stress), which is a contributing factor to the onset of bruxism.

Endocrine Sections, Gallbladder, Spleen / Pancreas and Vagus Nerve, were used to act on the digestive and endocrine, which may have contributed to the reduction in glycemic rate and reduced body weight.

The point Spleen / Pancreas was also used in order to act in the muscles, promotes muscle relaxation, thereby reducing muscle tension, which may have aided in reducing the perception of press and creak the teeth.

CONCLUSION
We conclude that this clinical case auriculotherapy decreased the activity of anterior temporal and masseter muscles the patient and benefits provided in oral and general health.

REFERENCES

INTRODUCTION

It has been suggested that the frequency component of the electromyography (EMG) power spectrum density (PSD) can be used as an indicator of motor unit recruitment. This assumption gets support from the findings that the average conduction velocity of the active muscle fibers is higher for fast twitch than for slow twitch fibers and that the muscle fiber conduction velocity is related to the frequencies of the EMG power spectrum. Furthermore, the muscle fiber type (I or II) and the level contract force may influence the frequency values or biomechanical changes that may alter the muscle function as the temporomandibular disorders (TMD).

Thus, we conducted a study to verify the EMG MF pattern behavior of the masseter and temporalis muscles in maximal clenching effort in health subjects and in patients with TMD.

METHODS

Fifteen TMD patients (TMDG) (mean age 23±2.2 years) and 15 control subjects (CG) (mean age 22±2.7 years) were examined. All patients had arthrogenous TMD according to the Research Diagnostic Criteria for TMD (RDC/TMD). The study was approved by the local Ethics Committee. Disposable surface electrode (Ag/AgCl, Medical Trace®) was placed over the b_mtx and temporal muscles. Two trials (20 min interval between trials) were performed during maximum teeth clenching either on paraffin film (20 x 10 x 3 mm) or in intercuspal position. For the recordings, the subject was invited to clench as hard as possible, and to maintain the same level of contraction for 10s. Myoelectric signals were obtained using an 8-channel module (EMG System do Brazil Ltda), consisting of a band pass filter of 20-1000 Hz, an amplifier gain of 1000, and a common rejection mode ratio >100 dB. The sample frequency was 2 kHz. For each 1 s epoch of EMG signal, the MF of PSD was computed by taking the Fast Fourier Transform of 1024 Hz, Hanning window with 50% overlaps segments. The data analyses were performed using Matlab 7.1 software (The Math Works, Inc. Natick, MA, EUA).

Whereas the EMG signal is random, continuous and nonlinear in nature (Siegler et al., 1985), we assumed the possibility that MF could present a pattern behavior nonlinear. Therefore, the mean of the two trials were performed a linear and non-linear regression analysis was used.

RESULTS AND DISCUSSION

Regression has two types, linear and nonlinear. In nonlinear regression, large number of iterations are performed to minimize the merit function and the values of the parameters are non-linearly related to the model. Thus, the purpose of nonlinear regression is to determine the best-fit values for the parameters of a model by minimizing the chosen merit function. The nonlinear regression model that shown more adjusted for the same time-series data analysed in linear regression was polynomial second-order regression. The results obtained from the linear and nonlinear regression are shown in Figure 1.

Spectral analysis revealed a linear, monotonic decrease in MF during maximal clench run only right temporals. The same correlation coefficients (R²) for right temporals were found in linear and nonlinear regression (NG: R²=0.74 and TMDG: R²=0.84). The relationship between polynomial regression values and linear values were similar in normal group but the polynomial values consistently higher in TDMG for the right and left masseter muscle and left temporalis muscle.

Thus, the higher coefficient correlation (R²) in polynomial regression shown that the pattern behavior of the investigated mastication muscles in maximal clenching effort has decrease curvilinear in normal subjects and especially in patients with TMD. MF usually declines linearly with static loads, for example, leading same studies to describe muscle fatigue in terms of negative MDF slope (Hz/s). The curvilinear decreased pattern of MF observed in ours results, may be related to decreased strenght during the maximal clenching effort but does not to fatigue. These results indicated that polynomial 2nd-order regression have more accurately to compare slope and intercept of the MF between health and TMD subjects up to 10 s.

CONCLUSION

The pattern behavior of the median frequency on the jaw muscles in healthy subjects and TMD patients in maximal clenching effort is curvilinear. The endings suggest a nonlinear model to compare values of the slope and intercepts of curvilinear line between healthy and TMD subjects.

REFERENCES

BEHAVIOR OF ELECTROMYOGRAPHIC SIGNAL WITH THE POSTURAL SWAY OF SOCCER PLAYERS

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INTRODUCTION

Postural control is a determining factor in the execution of functional movements that require a high performance of the motor control coordination, such as sporting activities. In this study, the soccer sports activity was chosen, and more specifically, the technical movement of the kick. The objective of this study was to investigate the postural sway through the kick’s movement control. A vertical ball shooting machine (VBS) with an active target was especially developed to measure the effectiveness of the kick. This system was synchronized with electromyographic signal, accelerometer and force platform in order to recognize the movement.

METHODS

Eleven professional athletes of soccer kicked the ball twenty-five times on target using the VBS system by EMG System do Brazil Ltda. Data analysis was proposed for identification and correlation of the signal behavior of the middle gluteus muscle (GL), tibialis anterior (TA), peroneus longus (FL) and vastus lateralis (VL) in relation to stabilometric variables of postural sway before the kick, during the kick and after the kick. It was analyzed of stabilometric variables: the mean position, standard deviation, total displacement, amplitude, speed, median frequencies in the anteroposterior (AP) and mediolateral (ML) of the center of pressure (CoP) and direction of oscillation during the controlled kick.

The study was approved by the local Ethics Committee. Disposable surface electrode (Ag/AgCl, Medical Trace®) was placed over the muscles according to recommendation of SENIAM. The EMG signals were obtained using an 8-channel module EMG800 (EMG System do Brazil Ltda), consisting of a band pass filter of 20-1000 Hz, 16 bits of resolution, an amplifier gain of 2000, and a common rejection mode ratio >100 dB. The sample frequency was 2 kHz. The postural sway were obtained using platform force model BIOMEC400 by EMG System do Brazil Ltda synchronized with the EMG System model EMG800C.

RESULTS AND DISCUSSION

The results showed the same trends in the behavior of the RMS (root mean square) of the gluteus medius muscle (LG), tibialis anterior (TA), peroneus longus (FL) and vastus lateralis (VL) before the kick, during the kick and after the kick. This was also observed in the analysis of the variables stabilometric, standard deviation, velocity, median frequency in anteroposterior (AP) and mediolateral (ML).

CONCLUSION

Considering the results of this study, analysis of the behavior of EMG signals of the muscles involved in equilibrium during the kick synchronized with stabilometric variables through the force platform has proven to be an effective tool for analysis of movement in athletes of the soccer players during the execution of the kick controlled.

REFERENCES

BIOMECHANICAL ANALYSIS OF WEARING HIGH-HEEL SHOES IN STANDING POSTURE

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INTRODUCTION

The high heels shoes have great popularity. Although, its wearing implicates in many alterations in postural biomechanics, particularly in cinematics and cinetics of human gait, in distribution of plantar pressures, and others prejudicial effects1-5. Few studies investigated, in a quantitative way, the effects of high heels to the equilibrium and muscular activity of inferior members. Hence, the objective of this work was to evaluate the biomechanics repercussions of wearing high-heeled shoes for postural equilibrium and the electromyographic activity in adults women.

METHODS

It was selected 12 women, aged from 18 to 30 years, non-athletes and occasional wearing high heels from 8 to 10 cm (1-2 times a week). The study was conducted at the Laboratory of Biomedical Engineering, at the Federal University of Uberlandia with the approval of the Ethics in Research of the institution. The participants remained in unrestricted standing on a force plate in two different bipedal conditions: barefoot and therefore using a widespread model of high heels among women (scarpin, pointy, closed in the forefoot and heel, with 10 cm half-moon heels). Each condition was evaluated per 30 seconds with 30 seconds rest between them. The electromyographic signals were simultaneously recorded with stabilometry.

Stabilometry was used as a quantitative method of analysis which revealed balance control of the oscillations posture, the position of the center of pressure (COP). Thus, using a sampling frequency of 150 Hz, using a force plate model BioDynamicsBr of DataHominis Technology Company and software MATLAB®, the following stabilometric parameters were assessed: total area of the COP displacement and average speeds of the COP in antero-posterior and medium-lateral axis.

Surface electromyography was performed in the tibialis anterior, medial gastrocnemius and soleus muscles on the dominant side of the volunteers, with the use of the equipment MyosystemBr1_P84 DataHominis Technology. The placement and positioning of the electrodes and the preparation of the skin, followed the stipulations of the protocol SENIAM (Surface Electromyography for the Non-invasive Assessment of Muscles)6. The reference electrode was placed on the medial malleolus of the non-dominant leg. It was used for each muscle, the RMS (Root Mean Square) value normalized by the highest value of Maximum Voluntary Isometric Contraction (MVIC) held for 6 seconds for 3 times at intervals of 2 minutes rest between them.

Statistical analysis verified the non-normal distribution of the sample by the Shapiro-Wilk test. The EMG data were normalized by Box-processing Cox. In the inferential analysis between the barefoot and with heels, using the Statistica 7.0 software, we performed a paired t-test for the EMG data and the Wilcoxon test for stabilometric data with a level of significance of 5%.

RESULTS AND DISCUSSION

The research data obtained by surface electromyography are shown in Figure 1. The soleus muscle showed the highest electromyographic activity for the two conditions in the study, it was higher for the high heels situation. This result can be explained through the consideration of soleus as a tonic muscle related to support and postural stability maintenance. It was performed a comparison between the conditions and it was observed higher values of tibialis anterior muscle electromyographic activity for barefoot situation. Already with high heels, besides the soleus, there was higher activity of the medial gastrocnemius, which was similar to another study7. The statistical analysis of the conditions shows a significant difference (p <0.0001) only for the medial gastrocnemius muscle. Regarding the stabilometric data, all values of variables were higher wearing high-heeled shoes, indicating greater imbalance in this condition. It was observed, by the statistical analysis of the conditions, a significant difference (p<0.01) for the antero-posterior speed of COP displacement (Table 1). Probably, it was due to biomechanical changes in the musculoskeletal system resulting from the use of high heels interference on the compensation performance and postural adjustments to maintain stability.

CONCLUSION

Wearing high-heeled shoes causes alterations in muscle electrical activation dynamic of the lower limbs, especially with the increase of the medial gastrocnemius muscle activity due to the apparent attempt to compensate the imposed instability by this footwear type. Furthermore, it influences on postural balance, leading to greater postural oscillations, mainly in the antero-posterior direction.

REFERENCES


Table 1 – Stabilometric data

<table>
<thead>
<tr>
<th></th>
<th>Barefoot</th>
<th>High heels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (cm²)</td>
<td>Median</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>Min-Max</td>
<td>0.01-3.94</td>
</tr>
<tr>
<td>V-ml (cm/s)</td>
<td>Median</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td>Min-Max</td>
<td>0.13-0.79</td>
</tr>
<tr>
<td>V-ap (cm/s)</td>
<td>Median</td>
<td>0.17*</td>
</tr>
<tr>
<td></td>
<td>Min-Max</td>
<td>0.12-0.73</td>
</tr>
</tbody>
</table>

V-ml e V-ap - average speed of COP displacement in medium-lateral and anterior-posterior axis, respectively. * p < 0.01

Braz J Oral Sci. 11(2):158-347
BIOMECHANICAL CONSIDERATIONS OF INDOOR CYCLING

INTRODUCTION

"Jonathan Goldberg, 46 years, South Africa’s natural, Physical education teacher and former professional road bicycle racing, started pedaling in the garage of his home, to escape heavy rainfall, and also not to leave his wife, who was pregnant, home alone". At those times, he used a stationary bike adapted by himself. Soon after, companies of Fitness market became interested in industrialize this new bike. In 1995, was created the American company, Mad Dogs Athletics, that registered and patented the method of Indoor cycling training-CI titled Johnny g. Spinning Program.

METHODS

This is a literature review of recent ten years (2001-2011), based on literature by consulting the scientific articles, selected from the database of scielo and bireme from the sources Medline and Lilacs.

RESULTS AND DISCUSSION

Indoor cycling is defined as a type of sport in stationary bike, in which the load is subjectively quantified to a group of individuals who vary in age, sex and physical fitness, and with a variation of aerobic and anaerobic endurance training, with or without musical rhythm. There are five methods of classroom methods: “Spinning Program” are the “RPM” of Les Mills Aerobics; the “Cycle Reebok”, the “Power Bike” (Brazilian adaptation) and the “Power” of Keiser, all Pacing are similar to each other, but each has its particularities and peculiarities. Biomechanical and physiological components however are similar, each with its own goal, by varying the Cadence, which is the intensity of the rotation and the load resistance employed by wheel.

In the pedaling cycle, it is considered as zero degrees the highest point reached by pedal, also known as the neutral position. The pedaling cycle has two stages: propulsion phase (0-180°) and recovery phase (180-360°), also divided into four steps: thrust (315-45°), compression (45-135), return (135-225°) and drawn (225-315). In each degree the muscle or muscle group is required with more intensity than all the others. According to Xavier and collaborators (2001) within the first 90 degrees there is high activity in femoral quadriceps and gluteus maximus group. From 90 to 180 degrees, the hamstrings and gastrocnemius are most active. On return of the cycle up to 180, 270 degrees, occurs some activity in the hamstrings, gastrocnemius and dorsiflexors. 270 to 360 degrees and (top back), there is high activity in the rectus anterior, tibialis and femorais. Figures 1 and 2 illustrate the muscle recruitment and the levers performed by the muscles of the lower limb during the pedaling cycle.

CONCLUSION

All the muscles of the lower limb act in this sport, being common postural changes: sitting or standing, with or without tilt, with greater or lesser muscle activity, which also varies with increased load and Cadence.

REFERENCES


AKNOWLEDGEMENTS

Financial support: FAPESPA/PIBIC/UFPA.
BIOPHOTOGRAMMETRIC ASSESSMENT OF HEAD AND MANDIBLE POSITION IN ORAL AND NASAL BREATHERS

INTRODUCTION
An ideal head and cervical posture enables a good development of the structures and functions of the stomatognathic system, because in physiological situation, a centric relation promotes balanced structures. An unnatural position of the head in relation to the neck in mouth breathers may lead to consequences to the spine, lower and upper limbs additionally an imbalance of the stomatognathic system functions and body axis. The head anteriorize position which can be measured through specific photogrammetric techniques.

Objective: to develop and apply a biophotogrammetric marker as a diagnostic indicator for the chronic oral breathing syndrome.

METHODS
A prospective control case study with 2 groups of 11 children between ages 8 and 12 years, diagnosed by otolaryngological examination as either nasal (NB) and oral (OB) breathers. We photographed all subjects with a lateral view and positioned markers at the tragus and at the acromial-clavicular joint, and drew vector lines of balizament, originated angular measures of analytical orientation (Figure 1): (1) Camper’s Planum / PC; (2) Mandible Rest /RM; (3) Head-Shoulder Relation /CO. We established intervals of reference using descriptive statistical analysis for the biophotogrammetric diagnosis. We compared the data of each group to obtain inferential statistical diagnoses.

RESULTS AND DISCUSSION
There was a significant correlation between PC and CO (p<0.05); RM was an effective predictor for diagnosing RN (angles between 41-47 degrees) and RB (angles less or greater than 41-47 degrees). (Table 1) The biophotogrammetric diagnosis was accurate in more than 90% of the cases of RN, and in 73% of RB, when analyzed by the biophotogrammetric equation integrated for Mandible /EBIM; in such cases, the interval between 113-141 degrees identified RN and that between 65-115 degrees identified RB. (Table 2)

CONCLUSION
The selected biophotogrammetric markers for mandible, head and shoulder positions were successful; RM and EBIM satisfactorily identified RB and RN.

REFERENCES
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Table 1. Biophotogrammetric analysis of the mandible rest (RM) angles, Camper’s Plane (CP) orientation and Head-Shoulder Relation (CO) in either nasal breathers (NB) or oral (OB).

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>50th percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>RM-NB</td>
<td>44.0009</td>
<td>3.78876</td>
<td>42.5700</td>
</tr>
<tr>
<td>RM-OB</td>
<td>39.8345</td>
<td>7.01519</td>
<td>40.4100</td>
</tr>
<tr>
<td>CP-NB</td>
<td>75.8164</td>
<td>12.59299</td>
<td>72.0100</td>
</tr>
<tr>
<td>CP-OB</td>
<td>38.8845</td>
<td>22.64984</td>
<td>32.8900*</td>
</tr>
<tr>
<td>CO-NB</td>
<td>8.0600</td>
<td>3.70836</td>
<td>8.6200</td>
</tr>
<tr>
<td>CO-OB</td>
<td>11.1764</td>
<td>3.90297</td>
<td>11.5900**</td>
</tr>
</tbody>
</table>

*Significant (p<0.01); **Relevant (p-value = 0.056).

Table 2. Descriptive Statistics of the records obtained by the biophotometric analysis to EBIM application in nasal breathers (Σ RN) and oral (Σ RO).

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>50th percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBIM (Σ RN)</td>
<td>127.8773</td>
<td>13.95076</td>
<td>123.9400</td>
</tr>
<tr>
<td>EBIM (Σ RO)</td>
<td>89.8955</td>
<td>25.21956</td>
<td>76.2800*</td>
</tr>
</tbody>
</table>

*Significant (p<0.01).
CAN IMPROVING THE SYMMETRY OF THE MUSCLES OF MASTICATION AFTER ORTHOGNATHIC SURGERY?
ELECTROMIOGRAPHIC ANALYSIS

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INTRODUCTION
Orthognathic surgery may correct these conditions, providing a better balance between face and cranium dimensions. It can also improve masticatory, phonetics and breathing functions. Orthognathic surgery also modifies the facial esthetics, and consequently causes benefit in the psychological status of patient.

The aim of this work was to investigate the electromyographical characteristics during the conditions of mandibular rest, isometric contraction (maximum intercuspation) of the masseter and temporal (anterior part) in bilaterally mode, before and after orthognathic surgery. Normalized and raw Root Mean Square (RMS) of the masseter and temporal was acquired, processed and used to calculate the symmetry indicator. All variables were submitted to statistical procedures.

METHODS
A total of 19 prognathic volunteers (9 male and 10 female), with ages between 18 e 36 years old (average 23.3 and standard deviation 8.2) in pre-operative period of 2 a 3 months before the surgery (T0); 2 a 3 months post-operative procedure (T1) and 6 to 8 months after the surgery (T2) were availed through electromyographic activity in the anterior part of the temporal muscle (right and left) and in the masseter (right and left). During all procedure, the volunteers stay sited in a chair, with the back supported by backrest, with the plan of Frankfurt parallel to the ground, eye closed, feet on the floor, arms resting on the lower limbs. Before each record, the same posture was taken to standardize the registration.

The electric activity observed in the masseter and temporal muscles in both side (right and left) in condition of rest, isometric contraction (maximum intercuspation) and isotonic contraction (mastication) recorded in microvolt (μV) and acquired in frequency of 2000Hz and resolution of 12 bits were submitted to a high pass filter of 500Hz and then used to calculate the RMS value (the square root of the sum of each squared data) through software Miosystem BR-1, version 3.0.

The symmetry were calculated as PCS%, with the formula:

\[
\text{PCO(\%)} = \frac{\text{abs(right muscle} - \text{left muscle})}{\text{right muscle} + \text{left muscle}}
\]

RESULTS AND DISCUSSION

Table 1. Mean (Standard Deviation) and comparison of means of absolute RMS of different phases through Tukey test at level of 5% in maximal voluntary contraction (MVC).

<table>
<thead>
<tr>
<th></th>
<th>Right Temporal</th>
<th>Left Temporal</th>
<th>Right masseter</th>
<th>Left masseter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre surgery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 - 3 months (T0)</td>
<td>95.02 (51.02)</td>
<td>93.93 (33.43)</td>
<td>107.46 (70.06)</td>
<td>80.86 (44.12)</td>
</tr>
<tr>
<td>Post surgery</td>
<td></td>
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<tr>
<td>2 - 3 months (T1)</td>
<td>80.77 (53.27)</td>
<td>74.20 (40.27)</td>
<td>82.23 (56.97)</td>
<td>60.25 (40.50)</td>
</tr>
<tr>
<td>6 - 8 months (T2)</td>
<td>100.61 (50.93)</td>
<td>87.20 (32.89)</td>
<td>96.34 (53.22)</td>
<td>83.98 (43.67)</td>
</tr>
</tbody>
</table>

* significant 5%; ** significant 1%, ns = Not significant difference.

Table 2. Mean (Standard Deviation) and comparison of means of absolute RMS of different phases through Tukey test at level of 5% in isotonic activity (mastication).

<table>
<thead>
<tr>
<th></th>
<th>Right Temporal</th>
<th>Left Temporal</th>
<th>Right masseter</th>
<th>Left masseter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre surgery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 - 3 months (T0)</td>
<td>65.31 (28.55)</td>
<td>59.74 (22.91)</td>
<td>51.21 (35.65)</td>
<td>55.33 (28.42)</td>
</tr>
<tr>
<td>Post surgery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 - 3 months (T1)</td>
<td>47.87 (23.31)</td>
<td>42.20 (25.67)</td>
<td>38.35 (26.65)</td>
<td>40.41 (39.63)</td>
</tr>
<tr>
<td>6 - 8 months (T2)</td>
<td>64.92 (34.61)</td>
<td>56.35 (30)</td>
<td>53.76 (45.48)</td>
<td>53.76 (45.48)</td>
</tr>
</tbody>
</table>

* significant 5%; ** significant 1%, ns = Not significant difference.

CONCLUSION
Orthognathic surgery has a significant influence in the changes of the electromyographic patterns when observed the RMS value and the symmetry providing a better balance in bilateral activities after the surgery and enhancing the neuromuscular equilibrium during the static and dynamic movements of mandible.

REFERENCES
INTRODUCTION

The temporomandibular joints (TMJ) have muscular and ligamentar components that interact with cervical spine and shoulder girdle. Authors have described the existence of patients with temporomandibular dysfunction (TMD) and cervical lordosis increased but others have observed no differences in cervical posture. The TMD’s include signs and symptoms that interfere in the TMJ musculoskeletal system and in some hearing system structures. Patients with TMD can report TMJ pain in one or both sides, reduction in jaw opening or chewing, irradiated pain to the head and neck. Currently the validated instrument for TMD evaluation is the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD). That questionnaire have two axis, the first refer to diagnostic criteria and the second to disability and psychological status. There are controversies in the literature concerning the relationship of cause and effect between TMD and postural changes. The aim of this study is to show the cervical posture conditions in young adults with TMD.

METHODS

This is an observational study about the possible relationship between cervical posture changes and TMD. It was used a convenience sample including academics, of both sex, between 18 and 40 years old. The exclusion criteria was: to have used orthodontics appliance, to have treated TMD or refused to participate in the study. The study was approved by the Comitê de Ética em Pesquisa da Faculdade de Ciências e Tecnologia – FTC in 03.03.2011 with the protocol number 3241. The academics formalized their participation in the study through the signature of free and informed consent, in accordance with the resolution 196 by Conselho Nacional de Saúde (CNS/MS). The RDC/TMD was used to evaluate the level of TMD and the postural evaluation was made by biofotogrametry. The cervical postural appraisal report was obtained with Software para Avaliação Postural (SAPO) based on the angle between the C7 spinous process, sternal manubrium and apex of chin. These variables were crossed to identify relationships between TMD and presence of cervical postural change.

RESULTS AND DISCUSSION

Only 30 out of 50 academics evaluated showed some classification of TMD by the RDC/TMD. In this group 70% was females and 30% was males. It could be justified by the majority population of females and reinforced by epidemiological data that the women are more susceptible to TMD. It was observed that 21 academics (70%) was included in group I (myofascial pain), 19 academics (63.3%) was included in group II (disk displacement) and 10 academics reported chronic pain following the classification by the axis II. It is important to inform that academics could be classified in more than one group by RDC/TMD. The angle of cervical posture in academics with TMD was between 70.5° and 96.6° with average of 86.1° (SD ± 6.14°). In the academics without TMD the angle of cervical posture was between 76.5° and 105° with average of 88.9° (SD ± 8.21°). The literature inform that people with TMD have cervical angle increased, on the other hand, this study observed a reduction tendency of this angle.

CONCLUSION

The results obtained show a possible relationship between changes in cervical posture and TMD, observed in the angles variations. It is suggested the continuity of this study with a larger sample and analysis of others variables like dental occlusion, static and dynamic postural alignment. These suggestions can clarify the relationship of cause and effect between posture and DTM.

ACKNOWLEDGMENTS

We thank to the academics and teachers of the Physiotherapy Course of the Centro Universitário Jorge Amado by their participation in this phase of the research and data collection.

REFERENCES

CHANGE IN THE EFFICIENCY OF MASTICATORY CYCLES IN SUBJECTS WITH TEMPOROMANDIBULAR DISORDERS

INTRODUCTION

Subjects with temporomandibular disorders (TMD) exhibit greater asymmetry of the muscles of mastication and the neck, which may be a compensatory strategy to achieve stability of the stomatognathic system during the masticatory function (Ries et al., 2008).

Unlike the root mean square (RMS) that measures the electromyographic amplitude values considering the isotonic contractions, the ensemble average of the electromyographic signal is a mathematical measure used to evaluate performance and efficiency in dynamic, non-stationary activities, such as chewing, only analyzing the periods of isometric contractions. (Siéssere et al., 2009).

By scarce literature that assesses the full envelope in patients with TMD, this study sought to verify the null hypothesis that there is no change in the efficiency of masticatory cycles masseteres and temporal muscles in volunteers with TMD using as voluntary control without TMD.

METHODS

Participated in the study 70 volunteers split into two groups, without TMD (n=35) and with TMD (n=35), selected considering by gender and age, and both are composed of 8 men and 27 women ranging in age between 14-57 years (mean age 33.6 years). Helkimo Index was used for the diagnosis of TMD. The electromyographic activity (MyoSystem-Br1, Brazil) of the masseter, and temporal muscles was used to evaluate the efficiency of masticatory cycles by means of ensemble average during mastication (10 seconds) of peanuts, raisins and paraffin. The processed data were normalized for maximum intercuspation and subjected to statistical test. Applied if the student’s t-test for independent samples considering the significance level of 5%.

RESULTS AND DISCUSSION

Through the data found in this study we see that the ensemble average in the group with TMD presented greater electromyographic activity not occurring intersection between the confidence interval of the two groups studied (Figure 1), therefore rejects the null hypothesis. However there is muscle behavior similar group without TMD and with TMD. Figure 1 shows that there is a symmetric activation between the left and right masseteres muscles, as well as between the right and left temporal muscles in both groups, for all situations tested chewing. In the chewing of the peanuts greater electromyographic activity of masseter muscle than temporal muscle is verified in both groups.

Comparative research in order to understand the differences between volunteers and controls with muscle or temporomandibular disorders, should be well tested using the same age and gender with clinical samples representatives (Suvinen; Kemppainen, 2007). In our study to reduce search these errors have been taken care in the selection of the sample.

CONCLUSION

On the evaluation of efficiency of masticatory cycles masseteres and temporal muscle group with TMD presented higher activity compared to the group without TMD. Despite this difference, symmetry of masticatory muscles for both groups was observed during chewing.

ACKNOWLEDGMENTS

The Special Patients Clinic - RPDS-USP

REFERENCES


Figure 1: Confidence Interval for the efficiency of masticatory muscles (MR - right masseter muscle; ML – left masseter muscle; TR – right temporal muscle; TL – left temporal muscle), while chewing of peanuts, raisins and paraffin, of the group without TMD and group with TMD.
CHARACTERISTICS OF CHEWING IN THE ARTHROGENOUS TEMPOROMANDIBULAR JOINT DISORDER

INTRODUCTION

Chewing is the more damaged function in patients with temporomandibular disorder (TMD). Clinical and electromyographic (EMG) methods have been used to evaluate the chewing function in these patients. The plotting method of the differential potential of the chewing muscles (Differential Lissajous plot) allows to study neuromuscular coordination in dynamic situations, but has not been so used. The aim of this study was to investigate the clinical and EMG methods, according to the differential analysis (Lissajous plot) of patients presenting arthrogenous TMD, compared to healthy individuals.

METHODS

Fifty-five individuals with arthrogenous TMD, according to the Research Diagnostic Criteria for TMD, (TMD Group: 50 women and 5 men, average age 32±11.34 years) and 35 five healthy individuals (C Group: 31 women and 4 men; average age 29±8.57 years). The measures used were: (a) Chewing difficulty scale, range of ten points, in which 1 represents the lowest and 10 the highest difficulty. The chewing difficulty level was obtained by the total sum of the scores attributed to each kind of food; (b) Evaluation of chewing according to the myofunctional orofacial evaluation with scores (AMIOFE); (c) EMG Analysis. Disposable Ag/AgCl bipolar surface electrodes fibers were placed parallel to the temporal and masseter muscles fibers on both sides. The EMG activity was recorded using a computerized instrument Freely (From Götzen srl; Legnano, Milano, Italy). The analog EMG signal was amplified and digitalized (gain 150, peak-to-peak input range 28mV, that is ±14 mV, 12 b resolution, 2230Hz A/D sampling frequency) using a differential amplifier with a high common mode rejection ratio (CMRR = 105 dB in the range 0–60 Hz, input impedance 10 GΩ), and digital filtering (range 30–400 Hz; filter for common interferences 50Hz). The recordings were performed during: (a) gum chewing on the right and left sides for 15 seconds each; (b) maximal voluntary teeth clenching with cotton rolls interposed between the first molars/ second premolars for 5 seconds (recorded for data standardization). A previously standardized protocol was used to the analysis of the masticatory/chewing frequency (Hz), work and balancing side activation pattern as represented by the ellipse angle (phase in degree), relative to the coordinate axes (differential masseter versus temporalis anterior EMG activities). Values between 0-90° describing unilateral chewing plotted to the right side and between 180-270° to the left side. To calculate the phase, chewing on the left was ratified in 180°. To assess if the left- and the right-side chewing tests were performed with symmetrical muscular patterns, using the centers of the two confidence ellipses (left and right-side chewing) calculated in each individual, a further index, symmetrical mastication index (SMI = 100, maximal symmetry). The interval data were statistically analyzed by the Mann-Whitney test for unpaired samples and for the EMG indices was performed an analysis of variance (ANOVA) with two variation factors (group and gender). Tukey post-test was used to compare averages with significant difference. The significance level was set at 5%.

RESULTS AND DISCUSSION

The degree of chewing difficulty was significantly larger for the TMD group (44.98 ± 17.84) than the C group (16.66 ± 10.04) (p <0.0001). The TMD presented a chewing from AMIOFE worse (7.93 ± 1.46) than C (9.29 ± 1.05) (p <0.0001), indicating a predominance of preferential or chronic unilateral chewing, while in C had predominated alternated bilateral chewing type.

In the EMG, there were differences between groups to the Phase (degree) (p <0.0001), mainly from chewing on the right side, where TMD individuals presented greater recruitment of the muscles of the balancing side. Also, the C group had a larger symmetry of the masticatory pattern (68.52 ± 18.88%) between the right and left sides than the TMD (45.91 ± 29.86%) (p <0.0001), in accordance with preliminary studies, indicating that in individuals with an appropriate occlusion and without dysfunction, the process occurs with symmetrical5 activity. There was no difference between groups for the frequency (Hz) EMG (p >0.05).

During the process it is expected that the chewing muscles act on the working side more than the balancing side. However, in the TMD group, we had observed an amount of subjects that showed a reverse pattern, which was reflected in the phase (angle) and in the symmetry index (%). The TMD group seems to have a tendency to increased activity of the balancing muscles, when it corresponds to the side of his usual unilateral chewing.

CONCLUSION

TMD patients reported chewing difficulty. Clinically unilateral chewing pattern was observed, which may explain the lower symmetry index and the increased recruitment of the muscles of the balancing side that was reflected in the phase (angle). The clinical and EMG diagnosis methods are complementary and useful for the rehabilitation planning of the orofacial motor functions.

ACKNOWLEDGMENT

This work was supported by CAPES.

REFERENCES

Characterization of the orofacial pain and temporomandibular disorder patients from FAODO/UFMS

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INTRODUCTION

The temporomandibular disorder (TMD) is a collective term that comprehends a specter wide of the clinical problems of the joint and muscle in the orofacial area; these disorders are characterized mainly by pain, sounds in the joint and irregular or limited function of the jaw. This pathology presents a multifactorial etiology and it has been related to emotional tension, occlusal interferences, loss of teeth, posture problems, chewing muscular disorders, parafunctional habits, internal and external arthritis, changes in the structure of the temporomandibular jaw, and several associations of these factors.

METHODS

This retrospective study has been made through the analysis of all reports of patients attended by the service of orofacial pain and TDM from the Department of Dentistry (FAODO-UFGS) – for the subject of fixed prosthesis and occlusion, from March, 2008 to November, 2011. The analysis of all the records was used as an inclusion criterion and those which were not filled out were automatically excluded.

The study observed: frequent temporomandibular disorders (muscular disorder, articular disorder or both), the relationship between gender and TDM, age and demographic location. The patients were supposed to fill out a clinical form which consists in the identification of the patient, the reason why the patient looked for help, reports of pain (time, place, intensity, frequency, duration, aggravating and alleviating factors of the pain) and habits. Complementary exams, such as muscular and articular evaluations were carried out. The muscular test was done through palpation, with the use of a kilo force on the muscles of the orofacial region. The patient was asked to grade from 0 to 3 for the pain during the palpation, 0 for no pain, 1 for soft pain, 2 for pain with complaints, 3 for a lot of pain with avoidance from the patient. The articular evaluation was carried out through palpation on the temporomandibular joint (pre and post condylar), presenting positive or negative answers for pain.

When the exams were finished and the clinical report was evaluated, it was possible to come to some probable diagnostics, which enables treatments to be established. These treatments can be provided by the orofacial pain service and TDM from FAODO-UFGS, or sent to the most adequate sector of the university.

347 reports from the above mentioned service were analyzed. However, 30 of them were excluded for not respecting the criteria established by the researchers.

RESULTS AND DISCUSSION

According to the methodology used in this study, the following results could be observed:

82.65% of the patients presented muscular TDM, preceded by articular TDM (12.30%), and 5.03% presented mixed TDM, muscular and articular types associated, in conformity with Wilhelmsen et al. (2006), whose study showed the prevalence of muscular TDM, reaching 48%, the articular TDM reached 6% and the associated type, only 2%.

For the relation between TDM and age, the research showed a bigger prevalence of TDM on those among 21 and 30 years old, as well as 41 and 50. Wilhelmsen et al. (2006) related that among the ages observed, those from 21 to 40 years old were the ones who looked more often for help. The research showed that female patients were the ones who looked more for help, representing 85% of the group, while the male patients represented only 15%. This difference between patients who have TDM is explained by some authors. They say in women the estrogen receptors of TDM and the hormonal changing levels caused by the menstrual cycle influence the threshold of pain. According to a psychosocial factor, women are more careful and tend to look for medical and odontological advice with more frequency than men.

The southern region represented the highest percentage (36.6%) of patients with TDM. The western region represented 24.3%, the eastern 21.1% and the northern region, 9.5%. The lowest percentage was represented by those who live in the countryside of the State, 8.5%. It is important to point out that the research was carried out at UFMS-FAODO, which is located in the southern part of the city. This fact may interfere with the results.

CONCLUSION

A bigger prevalence of muscular TDM, on women from 20 to 30 years old, and from 50 to 60 as well as a higher number of patients who live in the southern part of Campo Grande MS could be observed in this study.

REFERENCES

CLINICAL ASSESSMENT OF POSITIONAL RELEASE THERAPY IN TRAPEZIUS MYOFASCIAL PAIN SYNDROME

INTRODUCTION
The trigger points (TrPs) are palpable painful nodules that produce spontaneous referred pain by digital pressure (MENSE; SIMONS; RUSSELL, 2008). The presence of TrPs may lead to loss of productivity and consequent biopsychosocial inability, reducing the quality of life affected individuals. The pathophysiology of the formation of TrPs is not well understood, there are several theories that effort to explain this process (JORDÃO; BÉRZIM, 2010). Conditions affecting as macrotramas, microtrauma, ischemia, inflammation, functional overload, emotional stress, endocrine disorders, nutritional deficiencies, and chronic infections are considered predisposing to the TrPs formation (NIEL-ASHER, 2008). The objective this study was to compare the pain perception of the trapezius muscle before and after application of ischemic compression (IC) therapy associated with positional release therapy (PRT).

METHODS
This is a quantitative research type, with a descriptive approach and transversal exploratory, been previously approved by the ethics committee of State University of Paraíba - UEPB. The participants were a total of 15 volunteers with a diagnosis of TrPs active or latent. To evaluate the intensity of pain reported by patients was used Visual Analogue Scale (VAS), described by Sousa and Silva (2005). For therapy was followed the parameters: patient supine; digit pressure, shoulder abduction, the head tilt ipsilateral trapezius and contralateral head rotation. The residence time was until signs of local pain and pain referred stop.

The results were analyzed in a descriptive and inferential manner by the SPSS® 13.0 using Kolmogorov-Smirnov Normality Test and Student’s t-test for paired data, adopting a level of significance of 5% for acceptance of the null hypothesis.

RESULTS AND DISCUSSION
The sample average age was 21.73 ± 3.19 years, average height of 1.64 ± 0.069 average weight 64.46±9.99 Kg. Three subjects (25%) were males and 12 (75%) were female, all with latent TrPs. The average values of pain perception before treatment were 7 ± 1.19 and 0.99 ± 0.25 cm, the value after treatment in VAS. Data were presented as parametric using the Kolmogorov-Smirnov test.

The statistical analysis showed by Student’s t-test statistically a significant decrease in pain perception as measured by VAS (p <0.001) in about 87%. The Figure 1 shows the results.

CONCLUSION
This study may demonstrate that the combination therapy of IC and PRT can be effective for the treatment of latent TrPs, reducing pain perception. The small sample size (n = 15) is an important factor to be considered because it may have limited the significance of the results.

REFERENCES
COMPARATIVE ANALYSIS OF ELECTRICAL ACTIVITY OF ABDOMINAL MUSCLES DURING TRADITIONAL EXERCISE AND PILATES-BASED UNDER TWO CONDITIONS
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INTRODUCTION
The abdominal muscle has great importance in the movement of the trunk and stabilization of the spine thus the lack of conditioning this muscle can lead to biomechanics and conditions of pain. Pilates-based exercises have been reported in literature to be used for rehabilitation proposals. The objective of the study was to analyze and compare the electrical activity of the rectum abdominal and oblique external muscles during a traditional abdominal exercise and an exercise based on the Pilates method with a ball and an elastic band.

METHODS
The sample was composed of 10 healthy women who do not practice Pilates. They performed the traditional abdominal exercise and roll-up with the ball and elastic band. The sign was normalized by the electromyographic pick of the dynamic activity and they were adjusted for 2000 samples/s and the filter in a frequency band from 20 to 450 Hz. The electrodes were placed in rectum abdominal and oblique external muscles. The normality was verified using the Shapiro-Wilk test. The ANOVA was used to verify difference between the right and left side, between the concentric and eccentric phases and between exercises.

RESULTS AND DISCUSSION
In the comparison between exercises, the external oblique muscle in the concentric phase had higher recruitment in roll-up with ball (P=0.042). In the comparison between the muscles in each exercise, the rectum abdominal had higher activation in the concentric phase (P=0.009) and eccentric phase (P=0.05) than the traditional abdominal. The activation percentages ranged from 15% to 22%. During the exercise roll-up with elastic band higher activation percentage was found for the oblique external muscle when compared to rectum abdominal in eccentric phase (P=0.007). Between the traditional abdominal exercises: roll-up with ball and roll-up with elastic band significant differences were found to do with percentage activation to oblique external and rectum abdominal in concentric and eccentric phases. The traditional abdominal exercise had the largest activation percentage. Considering the biomechanics of traditional abdominal exercise requires the same great control of the rectum abdominal to carry the arms above the head while during roll-up the arms are positioned approximately with 30 degrees of flexion in the shoulder. Moreover the weight of the bell and endurance of the elastic band can help in movement of trunk flexion in both phases, which can justify higher electrical activity of abdominal muscles during the traditional exercise.

CONCLUSION
The traditional abdominal exercise causes higher abdominal muscle activity when compared to Pilates based exercises. Still evident the importance oblique external in stabilization rib cage in exercise that utilize arms. From this, it was observed that the Pilates-based exercise has less muscle activation and should be prescribed in the initial phase of a clinical program and during development exercise with higher electrical muscle activity must be used.

REFERENCES

ACKNOWLEDGMENTS
The authors wish to thank for the financial support the grants # 12/2010 –Scientific Initiation and Productivity Scholarship for the last author (CNPq).
COMPARATIVE ANALYSIS OF ELECTRICAL ACTIVITY OF THE MULTIFIDUS MUSCLE DURING PILATES, WILLIAMS’ FLEXION AND SPINE STABILIZATION EXERCISES

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INTRODUCTION
Back muscle weakness is related with the etiology of low back pain. Nowadays, there are several methods with the focus of back muscle strengthening. The purpose of this study was to compare and analyze the multifidus muscle bilaterally during exercises of the Pilates method, Spine Stabilization and Williams’ flexion.

METHODS
Ten healthy female volunteers participated in the study. They performed the leg pull front support exercise from the Pilates method, the quadruped exercise from the Spine Stabilization and the fourth exercise from the additional Williams’ flexion (figure 1). Electrodes were placed on the multifidus muscle, at the level of L5 spinous process, about 3 cm from the midline. The signal was normalized by the electromyographic peak of the dynamic activity and was adjusted to 2000 samples/s and filtered with a frequency band from 20 to 450 Hz. ANOVA was used to verify differences between the exercises, the paired-sample t test was used to compare activation between the right and left multifidus for each exercise.

CONCLUSION
The results showed that Pilates exercise, comparing activation percentage, provides higher muscle activity than the others analyzed exercises. Therefore, in clinical practice, considering these results, it is suggested to use this Pilates exercise in a late phase of the treatment. Besides this, the importance of the multifidus muscle as a stabilizer was observed.

REFERENCES

ACKNOWLEDGMENTS
The authors wish to thank for the financial support the grants # 12/2010 –Scientific Initiation and Productivity Scholarship for the last author (CNPq).

RESULTS AND DISCUSSION
When the exercises where compared, statistically significant differences were observed in the concentric and eccentric phases for the Pilates exercise, showing that this exercise is the one who activates the musculature the most between the exercises evaluated. Comparing the activation percentage between right and left multifidus, there was significant difference in the Spine Stabilization exercise done with the left leg, in the concentric phase. It showed an increased recruitment of the right multifidus. This possibly indicates the stabilization work done by the muscle so the movement of the contralateral leg may occur. In an architectural analysis of the multifidus muscle, WARD et al., concluded that this muscle is uniquely designed as a stabilizer to produce large forces.
COMPARATIVE FINDINGS BETWEEN ELECTRONEUROMYOGRAPHY AND SURFACE ELECTROMYOGRAPHY REGARDING DENTAL CLENCHING

INTRODUCTION
Electroneuromyography (ENMG) studies the nerve conduction velocities and analyzes a motor unit potential isolatedly or some potentials in its muscular resting activity or effort (Kimura, 1983). Surface electromyography (SEMG) studies muscular movement as a whole, its symmetry with the contralateral side and the activation of a particular set of muscles during determined movement (Berzin and Sakai, 2004). The aim is to analyze the applicability of these two methods in the evaluation of dental clenching.

PATIENT AND METHODS
This study was conducted in a female patient of 49 years old, with daytime and nighttime clenching that became more pronounced 10 years ago for stress and anxiety, TMD, diabetes mellitus and distal peripheral polyneuropathy in the lower limbs. Deviation of the lumbosacral spine to the left with the highest position of the right shoulder against the left. ENMG tracings were performed with 2 channel Nihon Kohden brand device. Electrodes of disposable co-axial needle was used inserted into the anterior and posterior temporal muscle, masseter, suprahyoid, genioglossus, intrinsic musculature of the tongue, posterior cervical, sternocleidomastoid and trapezius muscles bilaterally. The ENMG signals were recorded with low-frequency filter of 10 Hz and high frequency of 10,000 Hz.

The SEMG data were collected by using a device of the brand Lynx Electronics Ltda of 8 channels. Disposable surface electrodes were used for the collections of anterior temporal muscles, masseter, suprahyoid, posterior cervical, sternocleidomastoid and trapezius muscles bilaterally. The international standards recommended by the ISEK and SENIAM were followed. Low pass of 500 Hz and 20 Hz high-pass filters were used. Muscles by both methods were evaluated at rest and at maximal contraction.

RESULTS
There was hyperactivity when at rest, in all muscles studied by ENMG and SEMG. By SEMG it was seen that the anterior temporal muscles present greater activity than the masseteres at rest and at closing (in maximum intercuspation) and the suprahyoid muscles present hyperactivity at closing as well. By the ENMG it was observed that the traces are not interferential in the maximum effort, but showed motor unity potentials of normal duration and amplitude from both evaluations, higher activity at rest was observed and during muscular contraction of the right sternocleidomastoid and trapezius in relation to left.

DISCUSSION
These findings of hyperactivity, asynchrony and asymmetry of muscular activity may occur in the clenching (Learreta and Yavich, 2010). Postural disorders cause imbalance and hyperactivity and can be considered as contributors to clenching, but often this can by itself aggravate pre-existing clinical board (Goldstein, 1984). Traces of non-interferential with motor unity potentials of normal duration and amplitude in ENMG may relate to TMD in which there is decreased muscle power (Sato, 2003) but in this case it can also relate to the history of distal peripheral polyneuropathy diagnosed lower limbs.

CONCLUSION
It was concluded that the two assessments are important, fundamental and complete each other in the analysis of diagnostic clenching with TMD and of the patient as a whole.

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COMPARATIVE STUDY OF ELECTROMYOGRAPHIC ACTIVITY IN PRETERM AND FULL TERM INFANTS

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INTRODUCTION
The motor development is an important clinical parameter in the evaluation of prematurely born babies, hence their gross motor abilities seem to act as mediators for other development areas. Motor delay can be the first indicator of neuromotor disorders. Head control is an important component in the postural control development. Currently, electromyography has been an instrument used in the investigation for muscle postural activities in full-term (Hedberg et al., 2005) and pre-term (Fallang and Hadders-Algra, 2004) babies, including those with cerebral palsy. However, the assessment of motor development during the first months of life in infants born at term, and mainly in those born at preterm, is still a challenge for physiotherapists. It is important to have more data which analyze the EMG signal behavior for babies’ kinesiologic exam.

Objective
This study was aimed to compare the electromyographic activity of the posterior-superior muscles of the trunk of pre-term and full-term babies during head and trunk extension movement, in seated and prone postures.

METHODS
The study included 61 babies who were divided into two groups: group 1 consisted of 30 preterm babies (gestational age 31.4 ± 3.04 weeks), and group 2 consisted of 31 babies born at full term (≥ 38 weeks) both groups aged 15 days to 4 months (corrected in preterm group). Premature babies over 1.500g who were already in unheated cribs at Alzira Velano University Hospital’s (AVUH) neonatal ICU and at Cruz Preta high risk follow-up clinic, which belongs to the same hospital, were included. The full term babies were selected from the AVUH Speech Therapy clinic in Alfenas, MG. Babies with genetic abnormalities, neurological sequelae or any other situation that resulted in motor disorders were excluded. This study was approved by the Unifenas Human Research Ethics Committee. The procedures were performed following the SENIAM project’s recommendations. Surface electrodes were placed perpendicularly to spinous processes from T2 to T4 to assess muscular activity of the trunk posterior-superior region. Data on right and left sides were gathered simultaneously during 20 seconds and repeated three times for seated and prone postures. Each baby, regardless of the posture, was positioned on a mattress then received an audiovisual stimulus at a distance of 30cm in prone postures. Each baby, regardless of the posture, was positioned on a mattress then received an audiovisual stimulus at a distance of 30cm in prone postures. Data were analyzed by SPSS 17.0 software using the Mann-Whitney non-parametric test at p < 0.05.

RESULTS AND DISCUSSION
No significant differences in electromyographic activity of the right and left side were found during neck extension, while comparing the groups at full term and preterm in prone and sitting postures. Although many authors state that premature babies show motor delay compared to the full term babies (Pin et al., 2009), other studies, like the present one, found out contrasting results. However, many of these studies usually evaluate the gross motor performance, such as posture maintenance and acquisition, independent transferences and muscle tone. Mancini et al. (2002) when compared 32 infants (16 preterm and 16 full term) at the age of 8 and 12 months, using standardized developmental tests (AIMS and PEDI) observed no significant difference in the development of the motor function, between these groups. Gaetan & Moura-Ribeiro (2002) also evaluated 20 babies (10 preterm and 10 full term) using Chailey Ability Level Assessment Scale, and when comparing them, found that the development of early postural control takes place in a sequential form in preterm babies, similar to that of in full term babies. No studies comparing EMG activity among preterm and full term babies during the first months of life were found.

CONCLUSION
No difference was observed in the EMG activity of the posterior superior trunk muscles between preterm and full term babies. There are few studies that evaluate the EMG signal in babies, either full term or preterm ones, therefore it is necessary to observe the EMG signal characteristics in this population for more specific kinesiological comparisons and for predictive prognostics for babies with developmental delay.

REFERENCES

Table 1 – RMS values of μV ± standard error of preterm and full term babies in which pronor R represents right side prone posture; Prono L represents left side prone position; Sitting R, right side sitting posture and Sitting L, left side sitting posture.

<table>
<thead>
<tr>
<th></th>
<th>Prono R (μV ± SE)</th>
<th>Prono L (μV ± SE)</th>
<th>Sitting R (μV ± SE)</th>
<th>Sitting L (μV ± SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preterm babies (n=30)</td>
<td>28.70±1.93</td>
<td>32.27±1.72</td>
<td>30.37±1.43</td>
<td>28.77±1.51</td>
</tr>
<tr>
<td>Full term babies (n=31)</td>
<td>33.23±1.30</td>
<td>29.71±1.56</td>
<td>31.61±1.43</td>
<td>33.16±1.97</td>
</tr>
<tr>
<td>p-value</td>
<td>0.320</td>
<td>0.584</td>
<td>0.784</td>
<td>0.334</td>
</tr>
</tbody>
</table>
INTRODUCTION

The adaptive gait is more disturbing to the locomotor system than the free walk (Vitório et al., 2010), which may predispose the individual to trips and falls. Older adults have more possibilities of colliding with the obstacle and show caution to cross it (McKenzie, Brown, 2004) due to mechanical constraints (Lowrey et al., 2007), less ability to recruit muscle fibers and decline in strength (Taaffe, 2006) related to aging. Thus, electromyography signs and motion analysis of gait can indicate which are the main deficits in neuromuscular and locomotor behavior that happen due to aging. The aim of this study is to compare the electromyography and spatial-temporal parameters on adaptive gait of young and older adults.

METHODS

Eight young adults (age: 24.07±2.44 years, weight: 71.25±0.88kg, height: 1.75±0.04m) and eight elderly (age: 75.55±4.11 years, weight: 71.54±4.67kg, height: 1.67±0.07m) males participated in the study. For analysis of the adaptive gait, participants, at self-selected speed, walked over an 8m pathway with an obstacle, 0.15m of height, positioned at the center of the walkway. Each participant performed three trials. During the walk, electromyography signal was recorded by a biological conditioner (sample rate - 2000Hz) with eight channels (EMG System do Brazil Ltda.). The surface electrodes were placed in the muscles vastus lateralis (VL), vastus medialis (VM), biceps femorals (BF), lateral (LG) and medial (MG) gastrocnemius and anterior tibialis (AT) of the right limb. The signals acquisition followed the ISEK/SENIAM recommendations. The data were filtered with high pass Butterworth 4th order and bandpass filter 20-500Hz. Moreover, the acquisition of kinematic gait parameters was accomplished with a three-dimensional optoelectronic system (OPTOTRAK Certus), using a sample rate of 100 samples/s. Kinematic data were filtered with a 5th order low-pass filter with cutoff frequency of 6Hz. The data acquisition systems were electronically synchronized. The following parameters of the approaching and crossing stride were analyzed for each trial: RMS, peak EMG activity, muscle co-activation index, length, width, single support, double support and stride duration and velocity. The EMG parameters were normalized by the peak EMG activity of each pass for each participant. To compare the difference on adaptive gait between young and older adults was used ANOVA one-way for each stride (p<0.05).

RESULTS AND DISCUSSION

In the approaching stride, the ANOVA indicated a greater RMS of LG for the older adults (p<0.001) and VM for young adults (p<0.03), and higher maximum activity of VM for young adults compared to older adults (p=0.02). For the spatial-temporal parameters, statistical analyzes indicated longer stride duration (p<0.05) and slower stride velocity (p=0.05) for older adults. In the crossing stride, the older adults showed lower muscle co-activation index of BF/VL (p<0.001) and bigger RMS of VL (p<0.001) compared to young adults. For spatial-temporal parameters, statistical analysis indicated longer single support duration (p=0.01) and stride duration (p=0.03) for older adults compared to young adults (Table 1). The results indicated that older adults in the approaching stride need more time to acquire environmental information for planning the crossing, increasing the stride duration and decreasing the stride velocity (Tresilian, 2004). Additionally, older adults increased recruitment of VL to increase the propulsion before crossing the obstacle. In contrast, young adults increased the recruitment of VM. During the crossing stride, the older adults showed higher joint instability, which is a risky strategy and can result in falls.

Moreover, the older adults have increased the single support duration, which may increase the imbalance during crossing the obstacle. However, the older adults decreased the stride duration to improve the movement control during crossing the obstacle, facilitating the on-line adjustments during the task.

CONCLUSION

The older adults needed more time to plan for crossing the obstacle than young adults. However, the older adults used riskier strategy to crossing the obstacle, which can result in falls and stumbles.

REFERENCES


<table>
<thead>
<tr>
<th>Co-activation index</th>
<th>BF/VL</th>
<th>1,07±0,48</th>
<th>0,99±0,27</th>
<th>1,18±0,51</th>
<th>0,79±0,16</th>
</tr>
</thead>
<tbody>
<tr>
<td>LG/AT</td>
<td>1,19±0,44</td>
<td>1,33±0,31</td>
<td>1,09±0,26</td>
<td>1,02±0,51</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spatial-temporal Parameters</th>
<th>length (cm)</th>
<th>Width (cm)</th>
<th>Single Support (s)</th>
<th>Double Support (s)</th>
<th>Duration (s)</th>
<th>Velocity (cm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>young adults</td>
<td>124,55±5.64</td>
<td>119,63±21.07</td>
<td>130,81±8.79</td>
<td>131,61±18.67</td>
<td>115,73±7.11</td>
<td>106,89±20.04</td>
</tr>
<tr>
<td>older adults</td>
<td>107,02±7.76</td>
<td>103,09±18.38</td>
<td>111,36±12.38</td>
<td>114,34±14.40</td>
<td>103,74±8.56</td>
<td>105,63±10.92</td>
</tr>
</tbody>
</table>

Table 1. Mean and standard deviation of peak EMG activity, RMS, index of muscle co-activation and spatial-temporal parameters of gait adaptive young and older adults.
COMPARISON OF ELECTROMYOGRAPHY FATIGUE THRESHOLD OF ERECTOR SPINAE MUSCLES BETWEEN INDIVIDUALS WITH AND WITHOUT LOW BACK PAIN

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INTRODUCTION

Low back pain is a cause of functional limitations among individuals. Previous studies demonstrated that subjects with low back pain have a reduction in strength and endurance of the erector spinae muscles and also low resistance to fatigue. The electromyography fatigue threshold (EMGFT) has been an important method to demonstrate the endurance of a specific muscle. The purpose of this study is to compare the EMGFT of erector spinae muscles in low back pain subjects and asymptomatic ones during trunk extension test in the sitting position.

METHODS

The study included 10 volunteers (5 with low back pain and 5 asymptomatic paired by anthropometric characteristics) who signed a consent form (CEP 062/2011). For data acquisition, a 16-channel EMG system (MP150, BIPAC System, USA) with two amplifiers with an impedance of 2 MΩ, due to common mode rejection of 1000 MΩ, the signs were adjusted to 2000 samples per second and band pass filtered in 20 a 450 Hz. Bipolar active electrodes of 13.5 mm were connected to a preamplifier of 100 MΩ impedance. A data acquisition program was used (AcqKnowledge 3.9.1). The active electrodes were placed at L1 and L5. The reference electrode was placed on the radial styloid process. The electrode placement followed the recommendations of SENIAM (Surface-EMG for the Non Invasive Assessment of Muscle). The volunteers seated in an extension chair with a load cell attached to a vest with the other extremity fixed on the wall, with the hip fixed by a belt in 60° of flexion. To determine the maximal voluntary isometric contraction (MVIC) the subjects performed 3 trials of maximal strength of trunk extension for 5 seconds with 5 resting minutes among the trials and the highest value was used as reference. To determine the order of the loads (30%, 50% e 75% of MVIC) a simple raffle was used. The volunteers supported the trunk extension until exhaustion and a monitor was positioned in front of the participants in order to control the solicited load. The EMG signals were processed and filtered by subroutines in Matlab (version 7, The Mathworks Inc., Natick MA).

RESULTS AND DISCUSSION

The EMGFT values are presented in table 1. Determine the EMGFT is an important tool used to analyze the performance of human movement. However, the results of this study failed to determine the fatigue threshold of both groups. It is important to note that when a load is imposed to a muscle during a long time, spatial changes could occur and other portions of the same muscle are activated. And though there be compensations between the posterior muscles of the trunk that act synergistically during trunk extension. When a movement is constantly maintained and a load distribution occurs between the muscles in alternating periods of activity and passivity, which generates a variation of activity therefore a limitation on the capacity of the electrode to capture the real activity produced to maintain the established load. Another limiting factor for the determination of EMGFT is that subjects with low back pain seems to avoid excessive movement, which decreases the power generation, by protection factor to pain, and therefore is unable to activate the muscles sufficiently to produce muscle fatigue.

The non-determination of EMGFT can be related to the mathematical model used that depends on linear adaptations among the decrease of electromyography amplitude and the time during submaximal exercise. The findings of this study suggested that non-linear models may be able to predict the EMGFT.

CONCLUSION

It was not possible to determine the EMGFT.

ACKNOWLEDGEMENTS

The authors wish to thank for the financial support the grants MCT/CNPq #014/2010 and PPSUS/FA #CP 08/2009.

REFERENCES


Table 1: Electromyography fatigue threshold

<table>
<thead>
<tr>
<th></th>
<th>L1 D</th>
<th>L1 E</th>
<th>L5 D</th>
<th>L5 E</th>
</tr>
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<tbody>
<tr>
<td>Low Back Pain</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subjects</td>
<td>Md</td>
<td>Md</td>
<td>Md</td>
<td>Md</td>
</tr>
<tr>
<td>Low Back Pain</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subjects</td>
<td>(25-75%)</td>
<td>(25-75%)</td>
<td>(25-75%)</td>
<td>(25-75%)</td>
</tr>
<tr>
<td>EMG (MVIC)</td>
<td>51</td>
<td>59</td>
<td>47.5</td>
<td>32.2</td>
</tr>
<tr>
<td>Control Subjects</td>
<td>(34.9-53.9)</td>
<td>(48.1-109.1)</td>
<td>(29.4-59.3)</td>
<td>(11.3-57.9)</td>
</tr>
<tr>
<td>EMG (MVIC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Back Pain</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subjects</td>
<td>57.5</td>
<td>29.1</td>
<td>52.4</td>
<td>73.3</td>
</tr>
<tr>
<td>Low Back Pain</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subjects</td>
<td>(62.1-96.2)</td>
<td>(49.7-168.8)</td>
<td>(5.7-59)</td>
<td>(68-78)</td>
</tr>
<tr>
<td>Control Subjects</td>
<td>47.7</td>
<td>41.2</td>
<td>46</td>
<td>34.7</td>
</tr>
<tr>
<td>EMG (MVIC)</td>
<td>(44.3-53.1)</td>
<td>(16.3-45.8)</td>
<td>(3-60.9)</td>
<td>(28.8-44.7)</td>
</tr>
</tbody>
</table>
INTRODUCTION

The level of physical activity influenced in the locomotion pattern. Inactive individuals show modulations in the movement caused by worst neuromuscular condition (Graf et al., 2005). This can happen due to the reduced capacity that these individuals show to generate force, which decrease the capacity to promote joint torque (Pedrinelli et al., 2009). For walking, inactive individuals show modulations in the balance and propulsion (Petrella et al., 2005). However, there is a gap in the study of muscular activity behavior on gait of active and inactive individuals. Thus, the aim of this study was to compare the electromyography activity and spatial-temporal parameters on gait of active and inactive young adults.

METHODS

Twenty young male adults were distributed into active (n = 10; age = 24.7±2.85 years; weight = 73.21±10.05kg; height = 1.787±4.40m) and inactive groups (n = 10; age = 24.7±4.94 years; weight = 82.71±17.52kg; height = 1.788±5.56m) according to the practice or not practice regular physical activity and scores on the Questionnaire of Habitual Physical Activity (Baecke et al., 1982). The participants walked over an 8m pathway, at self-selected speed. Each participant performed three trials. During the walk the electromyography signal was recorded by an biological conditioner (EMG System do Brazil Ltda.) with precision of 0.1Kgf.

Before the task of walk, the individuals performed maximum voluntary isometric contractions (MVC) by a Leg Press device coupled of a load cell (EMG System do Brazil Ltda.) with precision of 0.1Kgf. To comparison the parameters electromyography and spatial-temporal between groups was performed ANOVA one-way (p<0.05).

RESULTS AND DISCUSSION

The ANOVA indicate higher RMS of VL (p=0.001) and stride width (p=0.004) for inactive group than active group (Table 1). The statistics analyzes did not show for peak EMG of the muscles, MVC, muscular co-activation index, length, width, duration and velocity. The EMG parameters were normalized by peak EMG activity in the central stride for each participant.

Table 1. Mean and standard deviation of the RMS, peak EMG activity, MVC, spatial-temporal parameters, co-activation muscular index and score obtained at Questionnaire of Habitual Physical Activity (HPA) for the active and inactive adults.

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Active</th>
<th>Inactive</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMS</td>
<td>Peak</td>
<td>RMS</td>
</tr>
<tr>
<td>VL</td>
<td>22.66±4.46</td>
<td>22.67±4.7</td>
</tr>
<tr>
<td>GL</td>
<td>21.51±5.98</td>
<td>27.17±6.05</td>
</tr>
<tr>
<td>TA</td>
<td>19.53±4.45</td>
<td>19.95±5.59</td>
</tr>
<tr>
<td>GM</td>
<td>23.03±5.24</td>
<td>24.05±4.91</td>
</tr>
<tr>
<td>VM</td>
<td>25.25±3.41</td>
<td>23.8±5.64</td>
</tr>
</tbody>
</table>

MVC(kgf) | 341.5±102.3 | 316.24±137.95

Spatial-temporal parameters

<table>
<thead>
<tr>
<th>Length (cm)</th>
<th>134.47±8.14</th>
<th>131.54±13.19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width (cm)</td>
<td>11.38±2.53</td>
<td>13.56±3.08</td>
</tr>
<tr>
<td>Duration (s)</td>
<td>1.11±0.07</td>
<td>1.08±0.117</td>
</tr>
<tr>
<td>Velocity (cm/s)</td>
<td>121.88±11.58</td>
<td>122.52±17.9</td>
</tr>
</tbody>
</table>

Co-activation Index

| BF-VL | 1.33±0.74 | 1.27±0.59 |
| GL-TA | 1.13±0.8 | 1.52±1.42 |

CONCLUSION

Generally, inactive and active adults showed similar muscle behavior for the free walk. However, the inactive individuals need bigger stability during gait.

REFERENCES

COMPARISON OF DIFFERENT PROTOCOLS PAIE MEASUREMENT THROUGH BIOPOTENTIALS

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INTRODUCTION

Pain is an unpleasant sensation associated with actual or potential tissue damage (Barr, Nielsen et al., 1986). Pain assessment is very important to establish the efficacy of analgesics and therapies, however, it is a complex and subjective experience so it is necessary a new method that quantifies it objectively. Biopotentials, such as the electromyographic signals (EMG) may aid in the study of pain. The reflection bending nociceptive (RFN) that is observed in the biceps femoris muscle with electrical stimulation in the ipsilateral sural nerve, has been used as a physiological nociceptive indicator as well as the M-wave, which are compounds muscle action potentials (Merletti, Knafitz et al., 1992) evoked by the stimulation of a motor nerve, as visualized in the EMG and may change it features in the presence of pain. The objectives of this study are to analyze whether there is a relationship between the RFN and M waves with pain.

METHODS

Experiment 1:
Participated in this study 13 volunteers, 6 males and 7 females. Five sessions of an experimental protocol were held. In each session, volunteers received electrical stimulations on the abductor hallucis muscle. Initially, 1 mA current with 20 pulses of 2 Hz was applied. Then, the electric current was incremented in 1 mA until volunteer reported maximum pain. For female volunteers, menstrual cycle day in each session was also recorded. Several M wave characteristics were evaluated.

Experiment 2:
Participated in this study 10 healthy males, aged between 20 and 27. In the right lower member (dominant) the volunteer had an stimulation electrode positioned on the external retromalleolar pathway of the sural nerve. In the biceps femoris muscle of the same member, the EMG surface electrode was fixed. The stimulation parameters were determined in the equipment Neuropack S1 MEB-9400 Nihon Kohden, the acquisition of electromyographic signals was controlled by the software Myosystem-Br1 version 3.5.6. Using a visual analog scale (VAS), we determined and the threshold level and the tolerance of pain of the subject, which were normalized with 0% and 100% respectively. Using the Visual Analog Scale and the RMS (root mean squared) as a function of the intensity of applied electrical stimulation. The data were stored on. Txt and analyzed with MatLab, where a specific interface was developed to process the signals. There was a statistical analysis based on Pearson’s correlation coefficient (r), coefficient of determination (r²) and linear regression.

RESULTS AND DISCUSSION

In the experiment 1 global minimum of the M wave is correlated to increased electric current amplitude of stimulation, and consequently to more pain felt by the individual. Female participants have reported pain threshold and tolerance with lower electric current intensity as compared to males volunteers.

In the experimente 2, there was a strong positive linear correlation from (r² = 0.9666 e r = 0.998307) in function of the stimulus and RMS (r² = 0.946 e r = 0.97). In the research of Chan e Dallaire (Chan, C W Y e Dallaire, M, 1989) is also demonstrated a linear correlation between VAS and the stimulus intensity, so with the intensity increase, the volunteers reported a higher number in VAS.

CONCLUSION

Experiment one concluded that the global minimum of the M wave was related to increased pain and in males pain threshold and tolerance were higher as compared to females. Different menstrual cycle phases have not interfered with evaluations. The experiment 2 concluded that it was possible to observe that RMS is a relevant parameter in pain subjective correlation.

In general we conclude that with the both protocols presented in this work, that the electromyography is a biopotential that may be used to correlate pain sensation and it signals, measuring the pain. Future works are needed to consolidate these results.

ACKNOWLEDGMENTS

Financial support: CAPES.

REFERENCES


Figure 1: Example of the relationship between M wave minimum peak and applied current.

CONCLUSION

Experiment one concluded that the global minimum of the M wave was related to increased pain and in males pain threshold and tolerance were higher as compared to females. Different menstrual cycle phases have not interfered with evaluations. The experiment 2 concluded that it was possible to observe that RMS is a relevant parameter in pain subjective correlation.

In general we conclude that with the both protocols presented in this work, that the electromyography is a biopotential that may be used to correlate pain sensation and it signals, measuring the pain. Future works are needed to consolidate these results.

ACKNOWLEDGMENTS

Financial support: CAPES.

REFERENCES

INTRODUCTION

Maximum strength (MS) and strength endurance resistance-training may induce different magnitudes of neuromuscular adaptations and fatigue\(^2,4\). The purpose of the study was to observe the neuromuscular responses induced by three consecutive days of MS training.

METHODS

MS trainings were performed on a knee extension machine (Tonus Fitness Equipment®-RT101) for three days interspaced by 24 hours. Neuromuscular responses were observed though vastus lateralis (VL), vastus medialis (VM), and rectus femoris (RF) surface electromyography (EMG) median frequency (MF), and peak force (PF) changes.

Subjects

Nine resistance-trained male subjects participated in the study (age: 28.6±5.8 yrs; body mass: 81.6±11.4kg; high: 1.8±0.1m). The project was approved by the Research Ethics Board from the College of Medical Sciences of the State University of Campinas (N° 523/2010).

Training protocol

Ten maximum isometric force sets of ~3 seconds, separated by 2 minutes rest were performed on a knee extension machine (Tonus Fitness Equipment®-RT101) adjusted so that the knee angle was ~70°, and PF was measured by a load cell (Reaccion®-CZCB-500) connected to the equipment.

Surface EMG

EMG data were recorded from the right limb using an eight channel EMG system (MyosystemBr1-DataHominis Ltda, MG, Brazil). After preparation of the skin (shaving, lightly abrading, and cleansing with 70% ethanol), a bipolar active electrode was attached using adhesive interfaces as described by the SENIAM\(^3\). The reference electrode (Bio-Logic Systems Corp®) was placed on the hip.

Data processing

EMG signal was acquired at a rate of 2000 Hz, pre-amplified (20x), and synchronized with the force signal that was acquired by the auxiliary channel of the EMG system by a pre-conditioner signal (DataHominis Ltda, C500). During the late off-line analysis, load cell signal was smoothed by a digital fourth-order Butterworth filter by using a cut-off frequency of 15 Hz\(^1\). EMG data were full-wave rectified and band-pass-filtered between 20 and 500 Hz using a fourth-order Butterworth digital filter. All the aforementioned parameters were obtained through specific routines created in MatLab 7 software (The MathWorks Inc, Natick, Massachusetts, USA).

Statistical analyses

Interaction of the responses throughout the sets and days were analyzed using the Analysis of Covariance. Linear regressions for the points were considered, and the intercepts and slopes were analyzed by the parallel lines model. Significance level was set at 0.05, and the analyses were performed in MatLab 7 (The MathWorks Inc, Natick, Massachusetts, USA).

RESULTS AND DISCUSSION

Peak Force (PF)

Table 1 presents the PF daily variation and its slopes for each individual.

EMG Median Frequency (MF)

Table 2 presents the EMG MF daily variation and its slopes for each individual.

Despite the PF decrements during the sessions, the same was not observed between days. The present and other recent studies\(^1\), observed no alterations in EMG MF following MS trainings. This observation may indicate that perhaps action potential conduction velocity was not reduced. The differences in magnitude of neural and metabolic responses during MS and strength endurance protocols may indicate the specific adaptations induced by these resistance-training protocols\(^2,4\).

CONCLUSION

Three consecutive days of MS training does not induce decreases in EMG MF during the sessions, and PF between the days.

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CONTRIBUTION TO THE ELECTROMYOGRAPHIC STANDARDIZED INDICES FOR THE DIAGNOSIS OF ARTHROGENOUS TEMPOROMANDIBULAR JOINT DISORDER

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INTRODUCTION

Several studies have investigated the potential of the electromyographic (EMG) indices that describe the coordination of muscle activity, rather than simply the activity of individual muscle, to the understanding of musculoskeletal occlusal function in healthy individuals and in patients presenting temporomandibular disorder (TMD).1-4

The scope of the term TMD and the understanding of its etiology and pathophysiology1 require the investigation of the aspects able to discriminate patients and healthy individuals based on groups selected through strict criteria. The purposes of this study were: (a) to investigate which EMG indices were useful to discriminate between patients with long lasting duration arthrogenous TMD and healthy individuals and (b) to analyze if the global EMG performance index could also be used for the same purpose.

METHODS

Fifty-five individuals with long lasting duration (> 6 months) TMD, classified as group IIa (displacement with reduction) and/or Group III (arthralgia or osteoarthritis), all patients with permanent teeth, and TMJ Disorders, according to Research Diagnostic Criteria for TMD, (Axis I) (TMD group: 50 women and 5 men, average age 32±11.34 years) and 35 healthy individuals, with at least 28 permanent teeth (Angle Class I), were enrolled in our study. Disposable Ag/AgCl bipolar surface electrodes fibers were placed parallel to the temporal and masseter muscles fibers on both sides. The EMG activity was recorded using a computerized instrument Freely (From Götzen srl; Legnano, Milano, Italy). The analog EMG signal was amplified and digitized (gain 150, peak-to-peak input range 28mV, that is ±14 mV, 12 b resolution, 2230Hz A/D sampling frequency) using a differential amplifier with a high common mode rejection ratio (CMRR = 105 dB in the range 0–60 Hz, input impedance 10 GΩ), and digital filtering (range 30–400 Hz; filter for common interferences 50Hz). The recordings were performed during: maximum voluntary teeth clenching (MCV) and maximum voluntary teeth clenching, with cotton rolls between the first molars/ second premolars. For each individual, the EMG potentials recorded during the MVC tests were expressed as a percentage of the average potential recorded during the MVC with cotton rolls (unit: μV/μV x 100). The index calculations were made according to Ferrario et al.: symmetry index of the pairs of muscles (masseter and temporal), calculated by the percentage overlapping coefficient (POC: zero (no symmetry), 100% (full symmetry)); asymmetry in the intensity of contraction of the muscles of right and left sides (ASIM, ranges from zero to 100%); potential lateral displacing components caused by unbalanced contractile activities of contralateral masseter and temporalis muscles (Tc, where 0%= absence of lateral displacing force to 100%= maximum lateral displacing force); activation of the most prevalent pair of chewing muscles (Ac, unit %). The average (masseter and temporalis) I standardized muscle activities (unit: μV/μV) were considered as the integrated areas of the EMG potentials over time. The reproducibility of these measurements was confirmed in our laboratory.4 EMG indices were used to formulate an overall performance score. Standardized weights were then assigned to the variables according to their biological importance and clinical influence to the function of the stomatognathic apparatus: temporalis and masseter POC were given a 25% weight each: an unbalance of their left-right standardized activity may result in abnormal loads over the TMJs. The TC index was given a 20% weight: the unbalanced contractile activities of contralateral masseter and temporalis muscles might produce an unstable position of the mandibular condyles in the articular cavity. The activity index received 20% weight: the occlusal center can be moved forward when the temporal muscles are prevalent or backward if the masseter muscles are prevalent. The Impact index was given a 10% weight: total activity standardized. The overall performance score was therefore a global z score (for definition, in a population, the z score = 0 and SD = 1). The groups were compared by Student’s t-test (unpaired samples). The significance level was 5%.

RESULTS AND DISCUSSION

There was no difference between genders, so they were considered together. There was no difference between groups regarding age. The average values of symmetry of the muscles were significantly larger in the C group (POC temporalis = 86.80±3.35%, POC masseter= 85.98±2.99%) than in the TMD (POC T= 80.68±12.87%, POC M= 77.43±15.62%) (p<0.01) as for the index ASIM (TMD: 14.04 ± 15.02%, C: 3 94 ± 3.47%) (p <0.0001). The Tc index was larger in the TMD group (12.72±15.48%) compared to C (4.13±3.85%) (p<0.01), as the Ac (TMD= 21.06±20 and C= 11.34±9.33). There was no difference between groups regarding the Impact. The index of global EMG performance was worse in the TMD (4.97±5.82) than in C (1.17±1.28) (p<0.001), allowing to discriminate the groups.

Current average values were in accordance with data obtained in previously analyzed control groups.1-4 The indexes deviating from the standard normality in cases of arthrogenous TMD may be associated with occlusion1, to the mechanisms to avoid the discomfort and pain, but also to the miofunctional condition, as recently verified.3

CONCLUSION

The research concluded that the muscle incoordination of the patients with arthrogenous TMD results from the asymmetry between the pairs of muscles, contralateral and anteroposterior unbalances. It also concluded that the performance score that encompasses these various aspects is useful for discriminating TMD patients from healthy individuals.

REFERENCES

INTRODUCTION

The movement to bring something to mouth when eating or drinking, is primordial for a functional independence and it’s one of the life’s daily activities that wants hands with great abilities for human. The secondary dystonia to Cerebral Palsy works against the patient autonomy and increases the manual work complexity, mainly when the patient got the adult age.(1) The aim of this study was to verify if there is correlation between manual grip ability, adjusting phase time, mean velocity and maximum velocity during the movement in Dystonic Cerebral Palsy (DCP) adult patients.

METHODS

After approved by the local Ethics Committee, 16 young adults (29.63 ± 4.42 years), with Cerebral Palsy, Dyskinetic type (DCP), 11 males and 6 females were evaluated. The classification was made with help of recording videos, using the MACS scale (Manual Ability Classification System), by a calibrated and blind examiner and using the patient’s grip ability as reference.

Data collection was performed at the Movement Analysis Laboratory - Albert Einstein Hospital - São Paulo, Brazil. The kinematic data were captured by nine infrared cameras, Vicon MX® 40 (Oxford Metrics Group, Oxford, UK) with a frequency of 60 Hz. Reconstruction was made by Vicon Nexus® software, processing and biomechanical modeling calculation were made as described by Rab, Petuskey, Bagley(2), used as reference for build head, trunk, pelvis, arms , forearms, hands, and third fingers segments and their respective joint centers, it was following recommendations of the International Society of Biomechanic (ISB)(3) in Smart Analyzer® (BTS spa, Milan, Italy) program and they were normalized by percentage of each cycle.

Patients were placed in a settable chair, keeping their feet on the ground, knees and hip with 90° flexion, trunk straight and supported on the backrest, fixed by a strip across the chest to keep stabilized, dominant upper limb supported on a desk at front, with a slight flexion of the shoulder and elbow. The patients realized a total of 6 repetition of grab the mug from the desk, with a 75% of their maximum range, bring to mouth and 75% of their maximum range, bring to mouth, seems to be related to the adjusting phase time, to really do the action of “to drink”.

The mean and maximum velocity reached during movement to take a mug and bring to mouth, seems to be related to the adjusting movement phase. Moderate negative correlation was found among mean velocity and adjusting phase (p=0.008, r= -0.635) and maximum velocity reached during the movement and adjusting phase (p=0.02, r= -0.562).

RESULTS AND DISCUSSION

We didn’t observed correlation between the MACS and the adjusting phase (p=0.41, r=0.219), that suggests no relation between the grip ability to grab the mug and the time lapsed during the adjusting movement, period that corresponds to time used for the patients to keep the mug at the mouth to really do the action of “to drink”.

However, the mean and maximum velocity reached during movement to take a mug and bring to mouth, seems to be related to the adjusting movement phase. Moderate negative correlation was found among mean velocity and adjusting phase (p=0.008, r= -0.635) and maximum velocity reached during the movement and adjusting phase (p=0.02, r= -0.562).

(figure 1 e 2).

The shorter adjustment phase time during movement, greater mean velocity during transport the mug, and consequently greater the maximum velocity achieved during the task.

Maybe the manual grip skill does not limit patients with DCP during the adjusting phase, but can influence the speed to accomplish the task.

CONCLUSION

The manual grip ability is not correlated to the adjusting phase time, but seems to be correlated with the median and maximum velocity during the evaluation movements for these patients.

REFERENCES


ACKNOWLEDGMENTS

National Council for Scientific and Technological Development (CNPQ), protocol number 429636.
CORRELATION BETWEEN MAXIMAL INSPIRATORY PRESSURE AND ELECTROMYOGRAPHIC ACTIVITY OF PARASTERNAL MUSCLE IN NORMAL INDIVIDUALS

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INTRODUCTION
During calmness breathing, the major muscles involved in the inspiration are, respectively, diaphragm, parasternal and external intercostals. Intercostal muscles formed in the lateral ribs, two thin layers in each of the intercostal spaces. In the intercostal spaces have only a single layer of muscle fiber. Between the sternum and the costochondral junction the external intercostals are replaced by a fibrous aponeurosis, leaving only the internal intercostal fibers. This portion is separate from the interosseus portion, both for its location and by function, and is called the “parasternal intercostal” (DeTroyer et al., 2005).

During respiratory muscle contraction parasternal is co-responsible for the movement of arm pump, expanding the rib cage in anteroposterior diameter (Moore, 2007).

This study analyzed quantitatively the relationship between maximal inspiratory pressure (Pimax) and electromyographic activity of parasternal muscles at different levels of inspiratory loading in healthy subjects.

METHODS
The study included 12 male volunteers, recruited among students from CUSC-SP. We used the 800C Electromyograph EMG (EMG System of Brazil®) with eight channels and bipolar electrodes Ag / AgCl, for the record electromyographic (RMS) bilateral parasternal muscle. Evaluation of inspiratory pressure (cmH2O) which is generated in the alveoli by the action of respiratory muscles was assessed by a manuvacuômetro (Generate®), which presents an operating range of 0 to +300 cmH2O adapted for expiratory pressure, and another interval of 0 to -300 cmH2O inspiratory pressures. The measurements were performed with patients sitting in a chair at 60°, with the nostrils occluded by a nose clip during the measurement of Pimax. Simultaneously with the implementation of the efforts of maximal inspiration, the record was collected electromyographic (RMS) muscle. To perform the sustained inspiration has been selected the highest value of five measurements performed between Pimax and from it, the two calculated inspired submaximal load levels, the latter being 25% to 35% and 65% to 75% for each individual.

The record of RMS voltage, during the Pimax was made for seven seconds in all samples, excluding the initial two seconds of analysis. Each inhalation sustained for each interval was performed three times and average RMS was made for analysis. The comparison between the RMS values between right and left sides was performed using ANOVA with post-test Newman-Keuls p <0.05.

RESULTS AND DISCUSSION
In relation to the general data analysis, no significant linear correlation between muscle activity of the parasternal (RMS) and the realization of Pimax at different load levels inspired (Table 1). Noting the correlation for each isolated electrode (right and left), the maximum values of RMS for the left parasternal were lower than the maximum values for the right parasternal (Table 2). The peak muscle activity after 75% of the Pimax can be explained by progressive increase of inspiratory load, and from this level the values are close to the maximum index of inspiratory pressure, where muscle activity is maximal. This peak is represented by a graph in a concave curve, already at levels below 75%, the results show a slight variation between the percentages of Pimax (25-35% and 65-75%) and parasternal muscle activity.

The correlation between the different levels of inspired Pimax and RMS has been demonstrated by other authors. In a study by Ng and Stokes (1992), characterizing quantitatively the relationship between load levels and inspired submaximal EMG activity of respiratory muscles and to evaluate the symmetry of the absolute values of EMG and the relationship between pressure/EMG between the two sides of the chest, also noted a spike in muscle activity after 75% of Pimax. They attribute this finding to the fact that the efficiency of the intercostal muscles are decreased during hyperinflation, thus this muscle to produce the same inspiratory pressure at high levels increases inspiratory muscle activation may explain the steep rise in EMG activity of respiratory muscles (Weiner et al., 1990).

CONCLUSION
After analyzing the data, we conclude that the parasternal muscle activity presents a significant peak after 75% of MIP in all subjects studied.

REFERENCES

Table 1: Mean values and standard error of Pimax (cmH2O) and submaximal load inspired.

<table>
<thead>
<tr>
<th></th>
<th>Pimax 100%</th>
<th>Pimax 25%</th>
<th>Pimax 35%</th>
<th>Pimax 65%</th>
<th>Pimax 75%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>133.6</td>
<td>33.41</td>
<td>46.77</td>
<td>86.86</td>
<td>100.2</td>
</tr>
</tbody>
</table>

Datas in cmH2O; ANOVA test; pós-teste Newman-Keuls; p<0.05.

Table 2: Mean values and standard error of the Pimax and RMS regarding the submaximal load inspired.

<table>
<thead>
<tr>
<th></th>
<th>RMS 100% r</th>
<th>RMS 25-35% r</th>
<th>RMS 65-75% r</th>
<th>RMS 100% l</th>
<th>RMS 25-35% l</th>
<th>RMS 65-75% l</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>51.87*</td>
<td>15.30</td>
<td>18.15</td>
<td>37.43</td>
<td>14.47</td>
<td>18.98</td>
</tr>
<tr>
<td>Standard error</td>
<td>8.643</td>
<td>2.372</td>
<td>3.719</td>
<td>4.831</td>
<td>1.004</td>
<td>2.556</td>
</tr>
</tbody>
</table>

Datas in μV; ANOVA test; pós-teste Newman-Keuls; *p<0.01. r = right parasternal; l = left parasternal.
CORRELATION BETWEEN NEW SPECTRAL INDEX AND TRADITIONAL SURFACE ELECTROMYOGRAPHIC INDICES

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INTRODUCTION

Surface electromyography (sEMG) spectral parameters (i.e. spectral parameters as mean and median frequency) as well as time parameters (i.e. root mean square amplitude) have been frequently applied to monitor changes in neural drive during maximal isometric contraction. During a sustained static contraction, the sEMG amplitude was reported to either increase, decrease or remain almost unchanged, while mean power spectra frequency usually usually decreased1. These controversial results obtained for the frequency and amplitude data, may be explained by the effects of the changes force and muscle fatigue. The changes in mean (Fmean) and median (Fmed) frequency and root mean square amplitude (RMS), are traditionally used as indices of peripheral muscle fatigue, however, in some cases these indices shown low accurately and sometimes contradictory. Dimitrov et al.2, proposed a new spectral fatigue indices (Flnsm5), defined as the ratio between the signal spectral moments of order (1) and normalizing spectral moments of order k=5. Thus, the aim of this study was to determine the correlation coefficient between this new index and the traditional indices (Fmean, Fmed and RMS) in masseter muscle during maximal clenching effort.

METHODS

Fifteen health subjects to participated in this study (mean age 22±2.7 years). The normality of the masticators apparatus was verify by Research Diagnostic Criteria for TMD (RDC/TMD). The study was approved by the local Ethics Committee. Disposable surface electrode (Ag/AgCl, Medical Trace®) was placed over the belliβy right and left masseter muscles. Two trials (20 min interval between trials) were performed during maximum teeth clenching either on paraffin film (20 x 10 x 3 mm) or in intercuspal position. For the recordings, the subject was invited to clench as hard as possible, and to maintain the same level of contraction for 10s. Myoelectric signals were obtained using an 8-channel module (EMG System do Brazil Ltda), consisting of a band pass filter of 20-1000 Hz, an amplifier gain of 1000, and a common rejection mode ratio >100 dB. The sample frequency was 2 kHz. For each 1 s epoch of EMG signal, the Fmean and Fmed of power spectral density was computed by taking the Fast Fourier Transform (FFT) of 1024 Hz, Hanning window with 50% overlaps segments. The new spectral index was calculated according to the following equations:

$$F_{Flnsm5} = \frac{\int f^{-1}PS(f)df}{\int f^0PS(f)df}$$

PS(f) (power spectrum as a function of frequency f) was calculated by the FFT. f1 and f2 stood for the boundary frequencies (20 and 500 Hz, respectively).

The percentage changes in values of Flnsm5, Fmean, Fmed and RMS for different segments were calculated from the first second of the initial EMG signal.

The data analyses were performed using Matlab 7.1 software (The Math Works, Inc. Natick, MA, EUA). The correlations of the percentage changes referent to initial value between Flnsm5 and Fmed, Fmed and RMS showed a negative correlation (Table 1).

RESULTS AND DISCUSSION

The results of the correlation coefficient (r) obtained after coparations between Flnsm5 and Fmean, Fmed and RMS showed a negative correlation (Table 1).

CONCLUSION

The changes in new spectral index show high and moderated correlation between mean and median frequency respectively and a low correlation with RMS amplitude. Furthermore, the sensitivity of detection of low frequency components of the EMG signal observed in the new spectral index may contribute to the future studies about the behavior of the masseter muscle in different masticatory conditions.

REFERENCES


Table 1. Correlation coefficient (r) between new spectral index (Flnsm5) and mean (Fmean) frequency (Hz), median (Fmed) frequency (Hz) and RMS amplitude (μV). The values were calculated to right (RM) and left (LM) masseter muscle.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>RM</th>
<th>p value</th>
<th>LM</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fmean</td>
<td>-0.87</td>
<td>0.001</td>
<td>-0.91</td>
<td>0.0002</td>
</tr>
<tr>
<td>Fmed</td>
<td>-0.76</td>
<td>0.01</td>
<td>-0.89</td>
<td>0.0004</td>
</tr>
<tr>
<td>RMS</td>
<td>-0.52</td>
<td>0.12</td>
<td>-0.58</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Figure 1. Linear representation of changes in Flnsm5 parameters (% of initial first 1-s) versus changes in different sEMG traditional parameters: mean (Fmed) and median (Fmed) frequency and RMS amplitude (% of initial first 1-s). The comparisons were performed in right (RM) and left (LM) masseter muscles.
INTRODUCTION
The temporomandibular disorder (TMD) is defined as a group of clinical changes involving the masticatory muscles, the temporomandibular joint (TMJ) and associated structures\(^1\). It is characterized by symptoms such as pain, limitation of mandibular range of motion, articular sounds, among other clinical conditions\(^2\). Some studies reported changes in microcirculation of individuals with TMD\(^3,4\). The present study aimed to correlate the skin surface temperature of masseter and anterior temporalis muscles with the degree of severity of TMD.

METHODS
Sixty female academic students from the city of Piracicaba were selected. The Fonseca’s Anamnestic Index (FAI) was used to assess the degree of severity of TMD. A total of 15 volunteers were asymptomatic, 15 had mild TMD, 15 moderate and 15 severe. Exclusion criteria were as follows: age under 18 and over 40 years, body mass index (BMI) higher than 25 kg/m\(^2\), in orthodontic or physiotherapeutic treatment, use of anti-inflammatory, muscle relaxants or vasoactive drugs. Also excluded were those with systemic disorders and history of facial trauma.

Infrared thermography was used to evaluate the skin surface temperature of masticatory muscles. The volunteers remained in a room with temperature around 22°C for a period of 20 minutes prior to data collection. The participants were given instructions to avoid taking hot baths, using topic agents, practicing vigorous exercises and intake stimulants two hours before the recordings.

A thermal camera T360 FLIR\(^6\) was used, with an emissivity of 0.98. The image was captured at a distance of 100 cm from the volunteer. Styrofoam markers were used due to their insulating characteristics, with the purpose of delimiting the origins and insertions of the evaluated muscles, enabling their further analysis in the infrared image.

To determine the temperature value, the QuickReport software version 1.1 FLIR Systems\(^6\) was used. Thus, a point on the average distance was set up between the markers, and the center of the muscle was established as shown in Figure 1.

Three images of each volunteer were captured and the mean of the values was calculated. The bilateral temperature of the anterior temporalis and the masseter muscles was quantified, as well as the temperature asymmetry obtained through the subtraction of temperature from one side by the other.

Shapiro-Wilk test was used to check data distribution. As data normality was not found, the Kruskal-Wallis test was applied for comparisons between the groups. Correlations between variables were carried out using the Spearman correlation coefficient. Data processing was performed using BioEstat® version 5.0

The study was approved by the Research Ethics Committee of the Methodist University of Piracicaba, São Paulo, Brazil, under protocol number 15/11.

RESULTS AND DISCUSSION
No significant association was found between the skin surface temperature of masticatory muscles and the FAI scores, as shown in Table 1.

The results of this study did not corroborate any other investigation. Barão et al.\(^3\) reported a decrease in skin surface temperature of the masticatory muscles in individuals with TMD due to the mechanical compression of vessels by muscular hyperactivity. Canavan and Gratt\(^4\) observed that individuals with TMD presented higher temperature asymmetry, when compared with the control group. However, none of these studies used the FAI to assess the participants. Emphasis should be given to the fact that the FAI has not been fully validated, despite its wide use in clinical research and epidemiological studies\(^4\).

CONCLUSION
According to the methodology used, the skin surface temperature of masseter and anterior temporalis muscles, as well as their respective asymmetries, have no association with the degree of severity of TMD.

REFERENCES
CORRELATION BETWEEN THE ELECTRICAL ACTIVITY OF THE MASSETER AND ANTERIOR TEMPORAL MUSCLES AND MANDIBULAR MOVEMENTS IN CHILDREN

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INTRODUCTION

The temporomandibular disorders (TMD) are reaching beyond the adult population, individuals with increasingly early ages. The diagnosis of TMD in both children and adults, is accomplished through a thorough investigation. Among various parameters for the clinical examination, highlights the importance of mandibular movements. These represent the functional stomatognathic system. Once changed, one can characterize clinical signs and great indicator of TMD. The understanding of these movements, as well as factors that interfere are important in helping to assess the functional diagnosis of the stomatognathic system. The understanding of mandibular movement is not restricted only to diagnosis, since it also has clinical applicability, as it contributes to the understanding of the stage of development of treatments, providing help for the treatment of choice accordingly. Thus, the study on issues involving their dynamics, both in adults and children, proves extremely relevant1. This research aimed to verify whether a correlation exists between the electrical activity of masseter and anterior temporal muscles bilaterally and jaw movements.

METHODS

The research was conducted on 306 children, aged 7 to 12 years in São Francisco do Conde, state of Bahia. Individual assessments were conducted, with measured steps through the millimeter caliper Starrett Series 727. Then began the acquisition of the EMG recordings in the masseter and temporal muscles bilaterally. Electromyographic analysis was performed in the condition of maximum voluntary isometric contraction (MVIC). The equipment was used with the software MIOTEC MIOTOOL 400, 4-channel, Low Pass Filter, a specific function to calculate the Root Mean Square (RMS).2 Statistical analysis used the SPSS (Statistical Package for Social Sciences) version 17 and version 11 STT. The margin of error used in the decision of the statistical tests was 5.0%.

RESULTS AND DISCUSSION

We evaluated 306 children, 156 (51%) were female, and 150 (49%) were men. The average age was 9.59 ± 1.40. Table 1 shows the mean and standard deviation of mandibular movements according independent variables. It was found that there was no statistical difference between these, except for the right masseter muscle in lateral movements (P <0.05). In one study investigated mandibular movement of 303 children 6-14 years and there was no difference between genders, suggesting that the data show that children do not have the sexual maturity of adults3.

Table 1 - mean and standard deviation of the standard madibular according independent variables.

<table>
<thead>
<tr>
<th>Variables</th>
<th>MMO</th>
<th>MLA-MD</th>
<th>MLA-ME</th>
<th>Protrusion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A varage ± D.P</td>
<td>A varage ± D.P</td>
<td>A varage ± D.P</td>
<td>A varage ± D.P</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>51.39 ± 5.50</td>
<td>8.34 ± 1.87</td>
<td>8.51 ± 1.91</td>
<td>4.06 ± 2.19</td>
</tr>
<tr>
<td>Female</td>
<td>50.52 ± 5.23</td>
<td>7.82 ± 1.96</td>
<td>8.12 ± 2.13</td>
<td>3.72 ± 1.83</td>
</tr>
<tr>
<td>p value</td>
<td>p(1) = 0.160</td>
<td>p(1) = 0.019*</td>
<td>p(1) = 0.096</td>
<td>p(2) = 0.135</td>
</tr>
</tbody>
</table>

(*) : Significant difference to the level of 5.0%; (1): Through the Student t test match. (2): Through the Student t test unequal; (3): Through F test (ANOVA)

Table 2 shows that there was no correlation between the electrical activity of the masseter and anterior temporal and bilateral mandibular movement opening, right and left laterality. Only the protrusive movement and the right and left masseter muscles proved correlated. Although not been tested electrical activity during chewing cycle in this study, it is known that the act of chewing movement depends on the balance of the jaw movements as well as the distributing of load during bites, as the applied force in steps chewing distributed so vary between periods of work and rest the muscles generating the harmony of the stomatognathic system and its functions. However, the electrical activity of muscle does not seem to maintain standards of dependence on the magnitude bite force and jaw movements that integrate the function related mastigatória4.

Table 2 - Pearson’s correlation between electromyographic activity ad mandibular movements.

<table>
<thead>
<tr>
<th>Variable</th>
<th>MMO</th>
<th>MLA-MD</th>
<th>MLA-ME</th>
<th>Protrusion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>r (p)</td>
<td>r (p)</td>
<td>r (p)</td>
<td></td>
</tr>
<tr>
<td>PM-TD</td>
<td>0.080 (0.161)</td>
<td>0.020 (0.724)</td>
<td>0.018 (0.758)</td>
<td>0.051 (0.379)</td>
</tr>
<tr>
<td>PM-TE</td>
<td>0.058 (0.315)</td>
<td>0.060 (0.293)</td>
<td>0.072 (0.209)</td>
<td>0.022 (0.702)</td>
</tr>
<tr>
<td>PM-MD</td>
<td>0.059 (0.302)</td>
<td>0.026 (0.657)</td>
<td>0.036 (0.525)</td>
<td>0.129 (0.025)*</td>
</tr>
<tr>
<td>PM-ME</td>
<td>0.048 (0.405)</td>
<td>0.021 (0.713)</td>
<td>0.055 (0.340)</td>
<td>0.117 (0.041)*</td>
</tr>
</tbody>
</table>

(*) : Statistically different from zero the level of 5.0%.

CONCLUSION

Through the results, we concluded that, overall, there was no difference between the mandibular movements of children and the female and male. Furthermore, it was found that there is no relationship between the electrical activity of masseter and temporal muscles bilaterally with the movements of maximum mouth opening, right and left laterality.

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CORRELATION BETWEEN TWO INSTRUMENTS FOR THE ASSESSMENT OF PAIN IN WOMEN WITH TEMPOROMANDIBULAR DISORDER

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INTRODUCTION

The temporomandibular disorder (TMD) is characterized by a set of changes involving the masticatory muscles, the temporomandibular joint and associated structures1. It affects mostly women and the adult population. Its main symptom is pain in the masticatory muscles2. Two assessment instruments can be used for TMD diagnosis: the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD), which allows standardization and research replication for the most common forms of TMD1, and the Visual Analog Scale (VAS), widely used to measure pain intensity. The main purpose of this study was to correlate the intensity of facial pain in women with TMD using these two instruments.

METHODS

The subjects consisted of 30 university female volunteers, average of 23.33 ± 4.93 years, diagnosed with TMD according to the RDC/TMD Axis I and II: Axis I evaluates the presence of muscular and joint pain, mouth opening pattern, DMA, noises, pain sensitivity during mandible motion and muscular and articular palpation, and Axis II evaluates graded chronic pain, depression, and non-specific physical symptoms. Exclusion criteria were as follows: volunteers in orthodontic and physiotherapeutic treatment, using anti-inflammatory, muscle relaxants or vasoactive drugs. Also excluded were those with systemic disorders and history of facial trauma.

VAS is a simple tool used to measure pain intensity. It consists of a 10 cm horizontal line with 0 on one end, representing no pain, and 10 on the other, representing the worst pain ever experienced, which a patient indicates so the clinician knows the severity of his or her pain at that moment. All volunteers received instructions on how to fill in the VAS and RDC/TMD.

Shapiro-Wilk test was used to check data distribution. As data normality was not found, the Kruskal-Wallis test was applied for comparisons between the groups. Correlations between variables were carried out using the Spearman correlation coefficient with significance level set at 5%. Data processing was performed using BioEstat® version 5.0

The interpretation of the correlation coefficients was based on Munro’s descriptors (2001): 0.26 to 0.49 (low), 0.50 to 0.69 (moderate), 0.70 to 0.89 (high) and 0.90 to 1.00 (very high).

The study was approved by the Research Ethics Committee of the Methodist University of Piracicaba, São Paulo, Brazil, under protocol number 15/11.

RESULTS AND DISCUSSION

The study showed that the volunteers had an average intensity of pain of 2.92 ± 1.99 cm using the VAS. In relation to RDC/TMD axis II, 12 (12.40%) volunteers were in Group I, 14 (46.6%) in Group II, 3 (10%) in Group III, and 3 (3%) in Group IV. Table 1 shows the correlation between the two analyzed instruments. It can be observed that there was no association between the variables.

Table 1 – Correlation of scores obtained by the volunteers in the RDC/TMD for the assessment of facial pain.

<table>
<thead>
<tr>
<th>Correlation</th>
<th>r</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDC/TMD x VAS Face</td>
<td>0.219</td>
<td>0.2449</td>
</tr>
</tbody>
</table>

RDC/TMD: Research Diagnostic Criteria for Temporomandibular Disorders; VAS: Visual Analog Scale

These findings can be explained by the fact that the VAS only considers the pain present at the time of the assessment, differently from RDC/TMD Axis II that classifies the individual according to his/her level of chronic pain. It regards the characteristics of momentary pain over the past six months and days of disability as a result of pain, and provides multi-dimensional information.

Accordingly, a single assessment of pain intensity cannot determine its severity levels; therefore, it becomes very important to observe the activity limited by pain4.

Von Korff et al.1 analyzed reliability of a pain measurement scale and found that pain intensity measures appeared to scale the lower range of global severity while disability measures appeared to scale the upper range of global severity.

The results of this study corroborate the aforementioned authors, since there was no correlation between the two measuring scales with similar characteristics to the present study, even tough the instruments were different.

CONCLUSION

Based on the methodology and the population used in this study, it may be concluded that there is no correlation between both instruments, RDC/TMD and VAS.

REFERENCES

INTRODUCTION

Ankle sprain is the injury with highest incidence in active population, and that individuals who suffered this injury, 40% continue to report feeling “giving way”, which is related to musculoskeletal dysfunction called functional ankle instability (FAI). Ankle sprains also cause a change of the muscle balance of the joint, which increases the recurrence of lesions. In this sense, the relationship of the ratio of the strength of inverters and eversors ankle muscles, measured by isokinetic assessment has been considered the gold standard test for functional diagnosis and prevention of ankle injury. Besides the isokinetic assessment, functional tests (FTs), inexpensive and very accessible to trainers and physical therapists of sports teams, have been widely used to evaluate the stability of the ankle joint. However, there are few studies that identified the association of the results obtained in functional tests and measures considered the gold standard in the neuromuscular evaluation of individuals with FAI. In line of this, the present study aims to compare the ratio of peak torque EVE/INV in individuals with and without FAI and correlate the ratio of peak torque EVE/INV to the score obtained in functional tests.

METHODS

The study included 18 volunteers recreational athletes of basketball, handball and volleyball aged 18-25 years old. The volunteers were divided into two groups: control group (CG, n = 10) with no history of ankle injury in the six months previous to the study, and the group with FAI (IG, n = 8), with history of inversion ankle sprain in the period between 6-3 months previous to the study, without clinical signs of mechanical instability in the anterior drawer test and talar tilt and score the questionnaire Cumberland Ankle Instability Tool (CAIT - Brazilian version) less than 25 points. Torque assessment was performed in an isokinetic dynamometer (Biodex®, New York, USA) with 5 repetitions maximum concentric at speeds of 60°/s and 120°/s in the inversion movement, the dominant member, for the CG, or member with IFT for the IG. Before to isokinetic assessment and implementation of functional tests, the subjects performed a heating in cycle ergometer (BIOTEC®, Nova Odessa, USA) for 3 minutes at 75 W and 70-80 revolutions per minute. Were performed five functional tests (FTs): single limb hopping course, the voluntary should do the jump as fast as possible by a course of eight squares, four of them were leveled, one had a slope of 15°, the other a slope of 15° and the other two with 15° side slope to the left and 15° tilt to the right, to simulate conditions that increased the inversion and eversion ankle, jump with one leg forward in the distance, triple jump with one leg to reach the maximum distance ; cross a path 6 feet jumping as quickly as possible, and cross a path 6 feet jumping across a line width of 10 cm in a single member as soon as possible. The functional tests were analyzed using the average of two trials conducted. The isokinetic data were analyzed by means of specific routines developed in Matlab (Mathwork®), using to process a low pass filter 4th order with cutoff frequency of 15 Hz, and thus were obtained peak values torque and then calculating the ratio of the conventional concentric movements of eversion/inversion (EVE/INV). Statistical analysis was used PASW 18.0 statistical package (SPSS.inc). After testing for normality movements of eversion/inversion (EVE/INV). Statistical analysis was conducted. The isokinetic data were analyzed by means of specific routines developed in Matlab (Mathwork®), using to process a low pass filter 4th order with cutoff frequency of 15 Hz, and thus were obtained peak values torque and then calculating the ratio of the conventional concentric movements of eversion/inversion (EVE/INV).

RESULTS AND DISCUSSION

No significant difference was found for the ratio EVE/INV movements performed at 60°/s and 120°/s (p = 0.82, p= 0.92, respectively) between the CG and GI. However, positive correlation was found between FTs 1 and 4 and ratio EVE/INV in healthy subjects (Table I). No correlation was found in individuals with FAI (TABLE II). The TF 1 aims to identify an ankle stability on uneven surfaces, assessing proprioception, balance and coordination. The maintenance of balance on one leg is realized by two strategies, the first being the use of the ankle, which uses the torque about the articulation to fine-tune movement. In line of this, the test has shown to be sensitive for evaluating the same variable, the torque. Then, the ratio of peak torque, which shows the muscle balance is an important variable to joint stability.

However, the correlation between the ratio EVE/INV with the TF 4, was not the expected result. This can be explained by the fact that the TF 4 which evaluates the power due to the performance of subsequent jumps. In this sense, the best way to evaluate the power in isokinetic exercise would be the calculation of rate of force development.

CONCLUSION

Against the results from the study the peak of torque ratio EVE/INV is not a variable that differentiates healthy individuals who have FAI. However, it is suggested that the TF 1 can identify a muscle imbalance in healthy persons and can constitute a tool for prevention of ankle sprains.

REFERENCES


ACKNOWLEDGMENTS

To FAPESP and CNPq for financial support to this project.

Table 1: Pearson correlation coefficients between the values of ratio conventional (EVE/INV) at speeds of 60°/s and 120°/s and FTs for the volunteers in the control group (n = 10).

<table>
<thead>
<tr>
<th></th>
<th>INV 60°</th>
<th>INV 120°</th>
</tr>
</thead>
<tbody>
<tr>
<td>TF 1</td>
<td>.733*</td>
<td>.18</td>
</tr>
<tr>
<td>TF 2</td>
<td>.00</td>
<td>.23</td>
</tr>
<tr>
<td>TF 3</td>
<td>.26</td>
<td>.41</td>
</tr>
<tr>
<td>TF 4</td>
<td>.648*</td>
<td>.29</td>
</tr>
<tr>
<td>TF 5</td>
<td>.12</td>
<td>.02</td>
</tr>
</tbody>
</table>

*p < 0.05. TF = functional tests, INV = inversion, EVE/INV = eversion/inversion

Table 2: Pearson correlation coefficients between the values of ratio conventional (EVE/INV) at speeds of 60°/s and 120°/s and FTs for the volunteers in the control with FAI (n = 8).

<table>
<thead>
<tr>
<th></th>
<th>INV 60°</th>
<th>INV 120°</th>
</tr>
</thead>
<tbody>
<tr>
<td>TF 1</td>
<td>.172</td>
<td>.204</td>
</tr>
<tr>
<td>TF 2</td>
<td>-.190</td>
<td>.000</td>
</tr>
<tr>
<td>TF 3</td>
<td>-.119</td>
<td>.032</td>
</tr>
<tr>
<td>TF 4</td>
<td>.071</td>
<td>-.119</td>
</tr>
<tr>
<td>TF 5</td>
<td>-.111</td>
<td>-.235</td>
</tr>
</tbody>
</table>

*p < 0.05. TF = functional tests, INV = inversion, EVE/INV = eversion/inversion
CORRELATION BETWEEN SURFACE ELECTROMYOGRAPHY AND HOFFMAN REFLEX IN THE ASSESSMENT OF SPASTICITY MUSCLE

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INTRODUCTION
The Stroke is a disease that affects the acute appearance of a area locus of the brain, causing by abnormal movement of the hemisphere cerebral, resulting in neuronal death. The spasticity, increased resistance to passive movement muscle emerges as a higher incidence of sequelae chronic after stroke, being directly dependent on the speed of movement, being related to high hyperrelexia and neuronal excitability'.

Although change in tone of easy identification, the quantification presents a greater degree of complexity, thus there are several methods used in the evaluation and quantification'.

Thus, the goal of this study was to identify the electromyo-graphic activity of the muscle soleus of spastic individuals and correlate with the Hoffman reflex, known as H Reflex.

METHODS
Study quasi-experimental in which 13 subjects were recruited with a clinical diagnosis of stroke, treated at the Clinic School of Physical Therapy – UNIPÉ, João Pessoa – PB, Brazil. Being 4 males and 9 females, mean age 59,84 ± 15,02 years, presenting a Picture of chronic spastic hypertonic. We evaluated the EMG surface of the muscle soleus by the value of RMS (Root-Mean Square) during movement of two different velocities in dorsiflexion (slow and fast), as well the H-reflex, and where the electrical stimulation of the member lower affect in the nerve of the posterior tibial in the popliteal fosse, also was captured motor response, the electrical stimulation of the member lower affect in the nerve of the anterior tibial and the ratio Hmax/Mmax.

The position to capture the signal EMG was performed according to the technical instructions SENIAM (http://www.seniam.org/).

Analysis statistical was performed using measures of central tendency (mean) an measures dispersion (standard deviation). We used the Shapiro-Wilk to observe normality the data, which shows no normal distribution. The Test Friedman was conducted to compare the EMG of the muscle soleus in three different moments. The Correlation Spearman was used to relate the EMG with the H-reflex. Attributed to statistical tests the significance level of 5%.

RESULTS AND DISCUSSION
The presence of electrical activity in muscle soleus at resting and in the completion of movement of dorsiflexion shows that the reciprocal inhibition is altered, probably due deficits generated in the pathways that are involved in the inhibition of muscle antagonist and/or because of facilitating the stretch reflex, responsible for activation height of the soleus muscle during movement1.

There was statistically significant difference by comparing the value RMS of EMG the muscle soleus in resting the of value RMS of EMG the same muscle during movements of dorsiflexion perfomed in both speed slow fast (p<0.005), Table 1.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Difference (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMG slow versus Hmáx/ Mmáx</td>
<td>-0.5814 0.0371</td>
</tr>
<tr>
<td>EMG fast versus Hmáx/ Mmáx</td>
<td>-0.5793 0.0379</td>
</tr>
</tbody>
</table>

The results observed in the comparison of the electrical activity of the soleus muscle at resting and during movement in two speeds corroborate the National Consensus Spasticity who conceptualizes it as a variable directly dependent on the speed applied during movement execution1. However, the comparison between the two speeds together, no significant difference due to uptake of EMG have occurred during active movement of dorsiflexion, which ossibly limited the movement execution, the difficulty presented in spastic, the differentiation of different speeds, associated with a decrease in the activation of existing motor units of the tibialis anterio, the deficit in motor control and posture typical of the type equinovarus foot, causing decreased motor activity of the muscle1.

By correlating the mean RMS of EMG during the slow and fast with the ratio Hmax/Mmax correlation negative was observed with statistically significant difference, table 2.

CONCLUSION
This study suggests that there is a moderate negative correlation between EMG surface and H reflex, which implies a divergence between the techniques in the assessment of muscle spastic individuals. Thus, the use of the H reflex or EMG surface, this assessment should be done in without further isolation comparison between the methods. Other studies must be conducted in order to examine methods to quantify the degree of spasticity.

REFERENCES
INTRODUCTION

The postural balance is used by humans to ensure stability by controlling their body segments to prevent falls. The central nervous system integrates and organizes information from the sensory systems (visual, somatosensory and vestibular) with the neuromuscular responses to guarantee the efficiency of maintaining the standing posture. Two variables are used to describe the behavior of postural balance: the center of mass and the center of pressure.

The center of mass (COM) is the variable used in Biomechanics to assess the behavior of balance. This variable is characterized as the single point where all body mass of an individual can be represented. However, the center of pressure (COP) is the parameter commonly used to describe balance for being easily obtainable, representing the location point of ground reaction force vector. It is an average of all the forces acting on the floor.

To identify which parameters describe the behavior of postural balance with similarity, the aim of this study is to correlate COM and COP variables in standing tasks.

METHODS

12 adult men (21.8 ± 2.0 years; 183.3 ± 6.9 cm; 82.2 ± 10.2 kg) participated of the study. The subjects were asked to maintain posture control for 30 seconds, as static as possible. In three trials the subjects were instructed to do the task looking at one point placed on the wall, while in the other three were instructed to do with the eyes closed. The feet were drawn on the floor hip-width apart to ensure reliability in measurements. Vicon Motion System was used to obtain COM data, while COP data was obtained from an AMTI OR6-6 force plate. The system acquisition frequency was 100 Hz, with both instruments in synchronism. The data passed through a 4th order Butterworth low-pass filter (5 Hz for COM data and 10 Hz for COP data), part of Vicon System.

The COP and COM parameter analyzed were: anteroposterior and mediolateral displacement amplitude (AMPap and AMPml), the RMS displacement measurements in each direction (RMSap and RMSml) and mean velocity. COP parameters were correlated with their matching COM using Pearson test. The correlation force was evaluated by Malina criterion, which values: below 0.3; between 0.3 and 0.6; and above 0.6 represents weak, moderate and strong correlations respectively.

RESULTS AND DISCUSSION

Table I shows the correlation results between variables.

The visual condition had no effect on results. In closed eyes condition was expected a weak correlation since a raise in oscillation frequency should occur, which apparently not happened.

CONCLUSION

The studied parameters allow say that either analyzing COM or COP data is possible to characterize the postural balance behavior with similarity to the present group.

REFERENCES


ACKNOWLEDGMENTS

Thanks to Federal University of Santa Maria and your Laboratory of Biomechanics, for the good physical space and receptivity which made this research possible.

Table I – Correlations between center of pressure (COP) and center of mass (COM) parameters.

<table>
<thead>
<tr>
<th>AMPap</th>
<th>AMPml</th>
<th>RMSap</th>
<th>RMSml</th>
<th>VM</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.947</td>
<td>0.929</td>
<td>0.561</td>
<td>0.871</td>
<td>0.733</td>
</tr>
<tr>
<td>0.954</td>
<td>0.900</td>
<td>0.765</td>
<td>0.809</td>
<td>0.822</td>
</tr>
</tbody>
</table>

AMP: displacement amplitude; RMS: root mean square; VM: mean velocity; ap: anteroposterior; ml: mediolateral.
INTRODUCTION

Biofotogrammetry represents a simple, non invasive and low cost postural evaluation method. Its greatest advantage is to allow that postural alterations can be quantified and small alterations can be detected. Another method of craniocervical posture evaluation is the cephalometric analysis, considered more accurate, as it makes possible a more objective visualization of the bones structures, which in this case, do not suffer influence of the soft tissues, as occurs in the biophotogrammetry. The biophotogrammetry, being more accessible and with lower complexity, is more required by professionals who accomplish postural evaluation. Therefore, it is necessary to correlate this method with cephalometric one, since this type of analysis offers a more trustful quantification of the angular and linear craniocervical measures. **Objective:** to verify the correlation between craniocervical measures obtained by the biophotogrammetric and cephalometric analysis.

METHODS

80 women, from 19 to 35 years old, were admitted in this study. For the cephalometric analysis, the volunteers were undergone to a right lateral radiography of the skull and cervical spine in their habitual orthostatic position. In order to reproduce the natural head position, they were instructed to look at their eyes on the mirror. The angular variables that measured craniocervical posture were: CVA (flexion/extension head position); CPL (forward head position); CVT/EVT (cervical column curvature). Head posture and cervical column were also measured through biofotogrammetric analysis by the software of posture evaluation SAPO®. Photographs were obtained with the subjects in their orthostatic habitual position, in the right view, reproducing the natural head position; likewise they did for the radiographic exam. Four biophotogrammetric variables were evaluated related to the craniocervical posture. Three angles measured the position of the head, two of them relative to the forward head posture: A1 – angle formed between tragus, spinal process of the seventh cervical vertebra (vertex) with the horizontal line reference; A2 – angle formed between external acoustic meatus (vertex), menton, and sternum furcula; and the other one related to the head flexion/extension; (FE): formed by the landmarks positioned at the seventh cervical vertebra, tragus (vertex) and palpebral comissure. The lower A1 and the greater A2, more forward is the head posture. Regarding FE, the larger this angle, the greater the posterior rotation of the head on the superior cervical vertebra. Cervical column curvature was also measured by the horizontal distance between a line tangent to the thoracic kyphosis, called thoracic plane, and to the point located on the apex of the cervical concavity. Correlations of craniocervical posture variables evaluated by both methods were tested by Pearson coefficient (r). It was admitted a statistical significance level of 5%.

RESULTS AND DISCUSSION

There was a moderate and significant correlation (p=0.00) between the craniocervical variables, which measured the head flexion/extension (CVA e FE) and the forward head posture (CPL e A1) (Table 1). In a recent study, Silva et al. pointed the use of the angle C7-tragus-horizontal to characterize the anterior projection of the head and the angle formed by tragus-eye-horizontal to characterize the posterior rotation of the head by the biophotogrammetric analysis. These angles showed a moderate and significant correlation with their correspondent cephalometric angles, CPL and CVA, respectively. Rocabado advocated that cervical curvature could be evaluated by the distance between a line tangent to the apex of the thoracic kyphosis, to one point located on the apex of the cervical concavity. In this study, however, this distance did not show any correlation with the cephalometric variable CVT/EVT, which corresponds to the cervical lordosis. This suggests that this photographic measure may be better utilized for the evaluation of the forward head posture than in the inference of cervical curvature.

CONCLUSION

It is possible to study head posture with confident methods and without radiation exposure. Considering the correlation found between both methods for variables which measured flexion/extension and forward head position, the biophotogrammetry can be preferentially chosen for head posture evaluation. However, taking into account the analysis of cervical curvature, the cephalometry may be more indicated, as it makes possible to visualize, in an objective way, the hard structures without the soft tissue influence.

REFERENCES


ACKNOWLEDGMENT

To CAPES (Coordination of the Superior Level Personal Amendment) for the financial support.

Table 1 – Correlation between craniocervical posture variables evaluated through cephalometric and biophotogrammetric analysis.

<table>
<thead>
<tr>
<th>Correlated Variables</th>
<th>r</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVA x FE</td>
<td>-0.41</td>
<td>0.00*</td>
</tr>
<tr>
<td>CPL x A1</td>
<td>0.68</td>
<td>0.00*</td>
</tr>
<tr>
<td>CPL x A2</td>
<td>-0.11</td>
<td>0.14</td>
</tr>
<tr>
<td>CVT/EVT x DC</td>
<td>0.07</td>
<td>0.52</td>
</tr>
</tbody>
</table>

Statistical significance: *p<0.05, **p<0.01, Pearson Coefficient Correlation(r).
CRANIOCERVICAL, MANDIBLE AND HYOID BONE RELATION AND ITS INFLUENCE ON ALIMENTAIRES FUNCTIONS

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INTRODUCTION

Atypical function can be caused, among other factors, by inadequate head posture, as form and function are intimately related. Considering that a craniocervical posture alteration can interfere on mandible and hyoid bone position, it can consequently influence negatively on stomatognathic functions. Objective: To evaluate the anatomical relation between craniocervical posture and mandible and hyoid bone position and its influence on the masticatory and swallowing functions.

METHODS

36 women from 19 to 35 years old were admitted in this study. Craniocervical posture and mandible and hyoid bone variables were measured by cephalometric analysis. Subjects were submitted to a right lateral radiography of the skull and cervical spine in their habitual orthostatic position. Intending to reproduce the natural head position, they were instructed to look at their eyes on the mirror. The angular variables that measured craniocervical posture were: CVA (flexion/extension head position); CPL (forward head position); CVT/EVT (cervical column curvature); CVT/NSL and OPT/NSL (cranium inclination in relation to cervical column on both two levels). Mandible position was evaluated through ML/NSL angle, which measures the inclination of the mandibular plane in relation to cranial base. Hyoid position was taken by its distance to the mandible (Hy/ML), menton (Hy/Me), and to the third cervical vertebra (Hy/C3). Masticatory and swallowing function evaluations were performed according to a protocol of orofacial myofunctional evaluation with Scores. Correlations of craniocervical posture variables with mandible and hyoid bone position variables were tested by Pearson coefficient (r). Qui-square test verify percentage differences among groups at the association between craniocervical posture alterations with the aspects evaluated on alimentaires functions. All tests admitted a statistical significance of 5%.

RESULTS AND DISCUSSION

Negative correlations were observed between CVA angle and the linear distance from the hyoid bone to the menton (p=0.02) and to the mandible (p=0.03). CPL angle demonstrated a significant and negative correlation with the linear distance between hyoid bone and jaw (p=0.00). The cervical curvature degree showed a significant correlation between the linear distances from hyoid bone to the third cervical vertebra (p=0.01). Alterations of the cranial base inclination in relation to the cervical column at the two levels (NSL/ CVT and NSL/OPT) were the only variables which showed a significant correlation with the mandible position (p=0.02). Modifications of the physiological cervical column curvature were the most evident postural alteration observed, as 86.11% of the subjects showed some kind of desalignment like rectification or inversion of the curve. All subjects presented at least one postural alteration on craniocervical segment. That’s why its association with the presence of orofacial myofunctional alterations was realized as the presence of only one or the combination of two or three of these alterations. Important craniocervical postural changes were observed in the group, although there was no association between them and a higher frequency of atypical behaviors evaluated during masticatory and swallowing functions. In accordance with Douglas, Avoglio et Oliveira, even in the presence of a structural alteration, the functions could be maintained through compensatory actions, a body mechanism to keep developing vital functions, in this case, represented by masticatory and swallowing functions. It may occur till the moment that these adaptive reactions became insufficient to pass by the damages on the system. Although, in this case, functions will be already suffering the signs and symptoms effects of a stomatognathic disorder, as can be observed, for example, in the presence of a temporomandibular disorder, previously related to atypical behaviors developed during masticatory and swallowing functions.

CONCLUSION

Cephalometric findings confirm the anatomical relationship between craniocervical posture, mandible and hyoid bone. However, the association between craniocervical posture alterations and masticatory and swallowing function impairments was not proven. Such findings suggest that, facing of a musculoskeletal imbalance, body readapts itself ensuring that alimentaires functions won’t be affected.

REFERENCES


ACKNOWLEDGMENT

To CAPES (Coordination of the Superior Level Personal Amendment) for the financial support.

Table 1 – Correlation between craniocervical posture and mandible and hyoid bone position.

<table>
<thead>
<tr>
<th>Variables</th>
<th>ML/NSL</th>
<th>Hy/Me</th>
<th>Hy/ML</th>
<th>Hy/C3</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPT/NSL</td>
<td>0.38</td>
<td>0.40*</td>
<td>0.34*</td>
<td>0.32</td>
</tr>
<tr>
<td>NSL/CVT</td>
<td>0.42</td>
<td>0.41*</td>
<td>0.36*</td>
<td>0.33*</td>
</tr>
<tr>
<td>CVT/EVT</td>
<td>-0.23</td>
<td>0.30</td>
<td>0.12</td>
<td>-0.40*</td>
</tr>
<tr>
<td>CVA</td>
<td>-0.27</td>
<td>-0.48*</td>
<td>-0.45*</td>
<td>-0.34*</td>
</tr>
<tr>
<td>CPL</td>
<td>-0.23</td>
<td>-0.17</td>
<td>-0.51*</td>
<td>-0.11</td>
</tr>
</tbody>
</table>

Results expressed in (r) value (Pearson coefficient correlation). n = 36; statistical significance: *p<0.05; **p<0.01
INTRODUCTION

During a soccer match, movements that require strength and maximum power are performed in both lower limbs. However, this occurs in an asymmetric way and gradually conducts to great changes in the muscular demand to the dominant lower limb (Fousekis et al., 2010). These changes may lead to strength asymmetry, mainly in the knee joint and result in bilateral imbalances (>15%), which have been widely associated to injuries occurrence in soccer (Devan et al., 2004). On the other hand, the muscular fatigue is a common experience to soccer players, being responsible for the decrease of the performance and the increase of injury risk during the match (Small et al., 2010). However, the influence of the localized muscular fatigue on the bilateral strength asymmetry in soccer players is unclear. Due to it, this research aimed to investigate the effects of localized muscular fatigue, induced by a maximal isokinetic contractions protocol, on the torque asymmetry between the dominant and non-dominant lower limb of professional soccer players, during knee flexion and extension movements.

METHODS

Twenty-six healthy professional soccer players (body mass = 73.0 ± 8.0 kg; age = 23.8 ± 1.5 yr; estature = 1.75 ± 0.6 m), with a training frequency of, approximately, 20-30 hours/week, competing in the A2 series of the Paulista championship were evaluated. The present research was approved by the local Ethics Committee (Nº 3200).

The dominant lower limb was considered as the one used to kick a ball (Fousekis et al., 2010). The evaluations between the lower limbs were randomized and separated by an interval of 24 h.

Previously the beginning of the tests, the volunteers performed a 5 minutes warm up in a cycloergometer (Biotec 2100®), with a cadence of 70-80 rpm and 50 W of load. Then, they were positioned in the isokinetic dynamometer System 4 PRO (Biodex®) and familiarized with the evaluations and the equipment.

The maximum pre-fatigue isokinetic strength of knee extension and flexion was tested at 60º/s in concentric and eccentric muscular contractions. The evaluated muscular group (knee extensors or flexors) was randomized and separated by 2 min interval. Five maximal efforts were performed in each test condition. The post-fatigue condition was tested the same way, separated by a 2 min interval. Five maximal efforts were performed in each test condition. The post-fatigue condition was tested the same way, separated by a 2 min interval.

After testing the normality with the Shapiro-Wilk test, was used the Friedman test to compare the AI of knee extension and flexion between the pre and post-fatigue conditions. It was adopted as significant level $P < 0.05$. The data is presented as median (range).

RESULTS AND DISCUSSION

The AI and percentage of occurrence of bilateral asymmetry (>15%) for the isokinetic movements of knee flexion and extension (concentric and eccentric), obtained before and after fatigue, are shown in Table 1.

There were no differences in the AI of strength between the conditions before and after fatigue in both types of muscle contraction during the knee flexion ($P = 0.896$). Also no differences were found between these conditions, in both types of muscle contraction, during knee extension ($P = 0.357$). However, it was observed that the percentage of athletes with high knee flexion and extension (concentric and eccentric) strength asymmetries (AI > 15%) increased after fatigue protocol (Table 1).

Athletes with knee flexors strength asymmetry above 15% are more likely to suffer injuries in the lower limbs than individuals with lower percentages (Devan et al., 2004). Consistent with these findings, Croisier et al. (2008) found that soccer players with eccentric strength asymmetries (>15%) are 4-5 times more susceptible to sprains of the hamstrings when compared to healthy players.

Moreover, others studies support these assumptions when reporting that the incidence of muscle strains are significantly lower in athletes with strength asymmetries normalized by specific training programs compared to others that do not adopt such strategies (Croisier et al., 2008). Therefore, strength asymmetries must be diagnosed and treated during pre-season in order to avoid increasing the risk of injury in soccer players.

CONCLUSION

In conclusion, muscle fatigue does not seem to change the knee flexors and extensors bilateral strength asymmetry in soccer players. However, the frequency with which asymmetries are observed in this population increases after the installation process of fatigue, suggesting increased risk of injury with the progress of the soccer match.

ACKNOWLEDGMENTS

This project is funded from grants from (CNPq), Foundation for Research Support of São Paulo (FAPESP) and Coordination of Improvement of Higher Education Personnel (CAPES).

REFERENCES


| Table 1: Bilateral asymmetry index (AI) and asymmetry frequency occurrence (AF) (dominant vs. non-dominant) pre and post fatigue protocol. |
|---|---|---|---|---|
| **CON** | **ECC** | **CON** | **ECC** |
| **AI** | **Flexion (%)** | 14.6 (2.7-35.7) | 14.6 (1.3-51.8) | 10.6 (1.2-43.0) | 13.1 (0.4-59.8) |
| **Extension (%)** | 8.6 (1.4-25.0) | 11.1 (0.3-47.9) | 10.3 (0.3-31.1) | 12.2 (0.2-92.9) |
| **AF** | **Flexion (%)** | 42.3 | 50.0 | 34.6 | 38.5 |
| **Extension (%)** | 19.2 | 38.5 | 23.1 | 42.3 |
INTRODUCTION
The use of surface electromyography (SEMG) to assess the neuromuscular function of the PFM using electrodes embedded on vaginal probes is widely used to increase our understanding of pelvic floor function. When SEMG is used clinically as well as in research, the extent to which the measure is valid and reliable is fundamental to the interpretation of the results obtained. Despite the common use of SEMG to describe pelvic floor muscle function, the reliability of the different devices used has not been fully established.1 Although good reliability of SEMG signals recorded from the pelvic floor has been reported in the literature both qualitatively and quantitatively, each of these studies used vaginal probes with different geometric properties, had detection surfaces of varying sizes embedded on them, configured the electrodes differently, and had subjects performing variations of similar tasks, making comparisons between studies less reliable. A closer investigation of the reported reliability values from these studies reveals significant limitations in their interpretation. Therefore, the interpretation of signals can be influenced by other muscles due to lack of standardization of the position of the patient and the electrode. The purpose of this study was to investigate the influence of two different positions of the same SEMG vaginal probe in the contractility of PFM in healthy women, when the ability to perform correct PFM contraction was controlled.

METHODS
This is a multicenter, prospective, observational and comparative study performed between November 2009 and February 2010. Twenty-nine female volunteer nulliparous were included. Inclusion criteria were women aged 20-35 years, with ability to perform a correct PFM contraction, that did not complain of any pelvic floor dysfunctions and tolerated and could keep the vaginal probe in place during measurements.

Vaginal surface electromyography was recorded with vaginal probe (Physio-Med Services39). Two electrodes were integrated in a styrene probe. The probe was 10.5 grams of weight, with 2.7 centimeters of the diameter (widest point). The cover had two longitudinal electrodes each one with a 10 cm² area, made of stainless steel.

Biological signals were obtained using an 8 channel module (EMG System do Brazil38). A reference surface electrode was positioned at the medial malleolus. This was a silver–silver chloride electrode (Medtracel70). Data collection was completed during one session, which lasted approximately 40 minutes. Once informed consent was obtained, demographic data were recorded as age and body mass index. Two probe positions were used in this evaluation: a) metal (electrodes) parts in lateral-laterally in contact with the side walls of vagina and b) these parts of metal in contact with anterior and posterior vaginal walls (antero-posterior position). The order of positions evaluation was randomized for each volunteer.

Then, the vaginal probe was positioned according to the randomized position (either lateral-laterally or anterior-posteriorly, black pen pointed mark) and subjects were instructed to perform three MVC of their PFM with thirty seconds of rest between contractions. Researchers observed correct contractions as probes inserted in the perineum made a cranial displacement. The best of three contractions was considered the MVC. After sixty seconds of rest, the probe was replaced according to randomization order and the above procedure was repeated. The highest computed RMS value was selected as the maximum voluntary electrical activity. After testing with Kolmogorov-Smirnov Test for Normality, the data are not normally distributed. The differences between parametric quantitative variables were evaluated with the Mann-Whitney test as appropriate.

RESULTS and DISCUSSION
The 29 women enrolled in study were 27.9 (±6.3) years old with a body mass index (BMI) of 23.9 (±3.2) kg/m2. When the vaginal probe was positioned lateral-laterally the MVC was 97.9 (±46.6) μV and antero-posterior position presented significantly lower MVC of 56.9 (±28.3) μV with p<0.001. More than half of the volunteers were physically active (61.3%) and performed PFMT regularly (52.9%).

The results of this study showed that the better myoelectrical signal was presented when the vaginal probe was positioned lateral-laterally. This could be explained because of the anatomy of PFM. These muscles are U-shaped and arise from the pubic bone on both sides and attaches to the pelvic sidewalls, perineal body and coccyx bone. Therefore, with the two electrodes in close contact with lateral walls of the vagina maybe the coupling area of electrical activity was larger than in antero-posterior position and consequently a better signal was obtained. Moreover, in the present study, a lithotomy position was chosen for carrying out the exam. The lithotomy position in an attempt to minimize contractions of the internal muscles of the hip region to maintain posture and to reduce the interference of these muscles (cross-talk) in the muscular contraction of the PFM.

CONCLUSION
In this study it was observed that vaginal probe positioned lateral-laterally presented the best amplitude and capture of the electromyographic signal. We suggest that this probe position should be standardized in other studies which include a two-electrode probe.

REFERENCES
INTRODUCTION

Annually, between 11 and 14% of the economically active population experiences limitations due to neck pain, which cause considerable social and economic impact. Its etiology is considered multifactorial and the pathophysiological mechanisms of chronic neck pain often remain obscure. Recently, studies have shown that the reduction of neck muscle strength is an important factor in the maintenance and chronicity of cervical disorders. The present study aimed to evaluate the strength of neck muscles and the dysfunction degree in women with and without neck pain, comparing them.

METHODS

This study involved 21 women with neck pain and 20 asymptomatic women, aged between 18 and 47 years old. All subjects were informed of the aims of the study and signed an informed consent term. Participants were assessed by means of the Neck Disability Index (NDI), which classifies the cervical dysfunction degree as absent (0–4 points), mild (5–14 points), moderate disability (15–24 points), severe disability (25–34 points) and inability to complete (35–50 points).

The cervical muscle strength was evaluated by means of a digital dynamometer (HHD Microfet 2) with two repetitions, maintaining the contraction for 6 s, one-minute interval between each repetition. The mean values of the records were used, expressed in kilograms force (kgf) and normalized by each volunteer’s body mass.

In the analysis were used the Lilliefors test, Mann-Whitney test, Pearson correlation and descriptive statistics. For all tests were assumed the significance level of 5% (p < 0.05).

RESULTS AND DISCUSSION

The mean score on the Neck Disability Index was 12.61 ± 4.9 points in the neck pain group and 2 ± 2.2 points in the asymptomatic one. Among the subjects with neck pain, 52% had mild disability, 48% moderate disability and no one presented severe disability.

In the group with neck pain, high percentages of moderate disability were found regarding reading and headache (61.9% and 66.67%). On the other hand, the personal care question was the least affected by the neck pain, comparing them.

In the group with neck pain, high percentages of moderate disability were found regarding  reading and headache (61.9% and 66.67%). One study demonstrated the NDI and cervical dysfunction degree as absent (0–4 points), mild (5–14 points), moderate disability (15–24 points), severe disability (25–34 points) and inability to complete (35–50 points).

The correlation found in this study could be explained by the low average score of cervical disability found in the sample.

CONCLUSION

Patients complaining of neck pain have reduced the strength of cervical flexor and extensor muscles. In the group with neck pain, high rates of the moderate and light disability were found in the evaluated tasks. It must be emphasize the importance of the functional assessment of the cervical muscles for the planning and adequacy of the treatment to these patients' needs.

REFERENCES


Table 1. Mean and standard deviation of the isometric strength of cervical flexor and extensor muscles of women with neck pain and asymptomatic (values normalized by body mass).

<table>
<thead>
<tr>
<th>Muscles assessed</th>
<th>Mean NG</th>
<th>SD NG</th>
<th>Mean AG</th>
<th>SD AG</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical flexor muscle</td>
<td>0.06</td>
<td>0.04</td>
<td>0.09</td>
<td>0.03</td>
<td>0.0022*</td>
</tr>
<tr>
<td>Cervical extensor muscle</td>
<td>0.09</td>
<td>0.04</td>
<td>0.14</td>
<td>0.05</td>
<td>0.0008*</td>
</tr>
</tbody>
</table>

NG: neck pain group, AG: asymptomatic group. * Statistical significance (p < 0.05). Mann-Whitney test.
EARLIER PEAK TORQUE IN INTERNAL ROTATORS OF ATHLETES WITH SHOULDER INSTABILITY OR SLAP LESIONS

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INTRODUCTION

Multiple studies have demonstrated imbalances of muscle strength in both asymptomatic and symptomatic overhead athletes (Saccol et al, 2010; Zanca et al, 2011). These studies demonstrated a relative or absolute strength increase in the anterior muscles and a relative or absolute strength decrease in the posterior muscles. This disproportion alters the anterior/posterior force couples that stabilize the glenohumeral joint and increase concavity/compression and decrease the deceleration capability for the shoulder in the follow through phase of throwing or serving. Consequently, the coordinated shoulder action depends on the capacity to produce torque, temporal recruitment of muscles and maintaining a balance of strength between external (ER) and internal rotators (IR) (Mattiello-Rosa et al, 2008). The aim of this study was to evaluate peak torque, time-to-peak torque and peak torque ratio of shoulder ER and IR in patients with shoulder instability or SLAP lesion and compare to healthy subjects.

METHODS

Six patients (22.83 ± 4.36 ys; 1.76 ± 0.05 m; 77.77 ± 8.32 kg) with diagnosis of shoulder instability or SLAP lesion in dominant shoulder and six healthy subjects (23.17 ± 3.87 ys; 1.76 ± 0.08 m; 79.17 ± 15.79 kg) were evaluated. Athletes with shoulder lesions were diagnosed and recruited during shoulder orthopedic clinical attendance in CETE/UNIFESP. The non-athlete subjects with no previous history of injury or participation in overhead sports were recruited among University students. All participants gave their written and informed consent agreement to participate in this study. The participants were evaluated in seated position with the dominant arm positioned at 90º of shoulder abduction and 90º of elbow flexion in a isokinetic dynamometer (Biodex Medical System Inc., NY, USA). Shoulder rotation torque was evaluated during isokinetic concentric mode at 90º/s with 5 repetitions. Peak torque, time-to-peak torque and peak torque ratio of dominant shoulder rotators were measured and analysed using Mann-Whitney test for statistical significance, with a p value of <0.05.

RESULTS AND DISCUSSION

No differences were found in the peak torque ratio and peak torque during ER and IR between groups (p>0.05, Table 1). For time-to-peak torque variable, the group of athletes with instability or SLAP lesions demonstrated a decreased time in IR compared to athletes in control group. This difference was not found for time-to-peak torque in ER. The decreased time-to-peak torque presented here is not favorable to the appropriate coordination between medial and lateral rotators of the shoulder. This change may cause alterations in the neuromuscular coordination in the force couple of these muscles (Mattielo-Rosa et al, 2008). Surprisingly, this decrease in time-to-peak torque occurred despite the maintenance of the peak torque ratio. Studies that investigated the subjects with multidirectional instability found alterations in recruitment patterns of deltoid and rotator cuff muscles (Morris et al, 2004) and a shorter duration of activity of the rotator cuff and posterior deltoid during medial and lateral rotations (Barden et al, 2005).

CONCLUSION

In our sample, athletes with instability or SLAP lesions presented a decline in the time-to-peak torque of IR compared to the control group, with no changes in peak torque or peak torque ratio. This represents an earlier contraction of IR during the movement and may be related to a mechanism of joint protection.

REFERENCES


ACKNOWLEDGMENTS

The authors are deeply grateful to the volunteers who participated in this study. Michele Forgiarini Saccol and Gisele Garcia Zanca were the recipients of research from Foundation for Research Support of São Paulo.

Table 1: Isokinetic external and internal rotation strength in instability/SLAP athletes and control group. Data are presented as mean ± SD.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Instability/SLAP group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak torque ER</td>
<td>32.80 ± 4.27</td>
<td>35.47 ± 11.46</td>
</tr>
<tr>
<td>Peak torque IR</td>
<td>40.36 ± 8.32</td>
<td>38.65 ± 13.48</td>
</tr>
<tr>
<td>Time to peak torque ER</td>
<td>294 ± 115.31</td>
<td>310 ± 132.51</td>
</tr>
<tr>
<td>Time to peak torque IR</td>
<td>362 ± 90.94 *</td>
<td>796.67 ± 281.18</td>
</tr>
<tr>
<td>Peak torque ratio (IR/ER)</td>
<td>0.84 ± 0.17</td>
<td>0.93 ± 0.08</td>
</tr>
</tbody>
</table>

* p < 0.05
EFFECT OF A MANUAL THERAPY PROTOCOL IN PATIENTS WITH CERVICOGENIC HEADACHE

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INTRODUCTION

It’s estimated that the prevalence of cervical pain in the population varies between 9.5% to 22%. Alterations in this region generate symptoms such as cervical pain, with or without irradiation to the extremities, or headache and can be severely disabling1). The IASP, International Association for the Study of Pain, defines neck pain headache as “unilateral pain attacks on the head, with moderate or accentuated intensity, involving all of the hemicranium, starting on the cervical or occipital region and irradiating with greater intensity to the temporal and frontal regions. Signs and symptoms start due to mechanical changes in the cervical region and nausea, phono or photophobia, vertigo and swallowing difficulties can be present”. Individuals presenting this symptom demonstrate substantial decline in quality of life measurements which is similar to the decline found in patients with migraine and tensional type headache2).

With that said this work is justified in the assessment of the evolution of five participants diagnosed with neck pain associated with headache and/or orofacial pain submitted to the manual therapy treatment.

METHODS

Five female individuals, with signs of cervical region pain, headache or orofacial pain participated in the study, with the criterion for inclusion being the presence of one of those symptoms. Evaluation consisted of personal data, inspection, touching in the cervical region and articulation mobility evaluation. Headache was identified observing the Diagnosis Criteria of greater importance from Sjaastad et al. Pain was evaluated before and after the treatment by applying McGill Pain Questionnaire, in the brazilian version. These questions provide, among others, the Pain Rating Index (PRI) and the Number of Words Chosen (NWC) to describe the pain. The PRI is based on values obtained for words in the sensorial (S), affective (A), subjective evaluation (SE) and mixed subclass (M) categories.

After initial evaluation, the individuals received treatment for a period of eight weeks, twice a week, and after this a new evaluation was performed. The protocol consisted of trapeze muscles stretching (superior and middle fibers), scalenes and sternocleidomastoid; muscle energy exercises with three series with three contractions each, cervical traction with the patient in supine position and the therapist positioned behind the patient’s head, applying traction force in the cranial direction; pompage with the patient in supine position and the therapist positioned behind the patient’s head with the hands on the occipital protuberance and slow, regular and progressive tensioning until the elasticity limit of the tissue; liberation of trigger points to suppress gamma hyperactivity of the spastic muscle; slow, gradual and low amplitude stretching, aiming to elongate fascias, ligaments, muscles and tendons. The descriptive analysis of the data (average, standard deviation) was made and, for statistical analysis, the paired t test and the non-parametric Wilcoxon test at a value of p<0.05.

RESULTS AND DISCUSSION

Two of the participants showed orofacial pain. Cervicogenic headache was identified in the five participants according to the diagnosis criteria from Sjaastad et al. (3) Figure 1 represents the average, standard deviation and the statistical p value of the comparison between before and after the treatment in relation to the Number of Words Chosen (NWC) and the categories of the Pain Rating Index (PRI) from the McGill pain questioning in all the participants. Only in the subjective evaluation (ES) category there was no meaningful difference before and after the treatment.

Some authors3) qualified, classified and measured pains originating from cervical spine and lumbar diseases, through the McGill questioning, which was applied three times in each patient. They assessed 60,98% of patients reported to feel relief of the pain due to the physiotherapy. After analysis of the data, it was observed through qualitative analysis of the words from the questioning, predominance of higher scores on the sensorial category, which indicates mainly physical pain, although with influence from emotional factors.

This study corroborates with Torelli et al.(5) who achieved significant reduction in the number of days of symptoms from chronic headache in patients under physiotherapeutic treatment based on stretching and relaxation of muscles.

CONCLUSION

According to the data, it can be verified that the manual therapy protocol used in the present study was effective in the alleviation of pain on participants with neck pain and cervicogenic headache. Nonetheless, the sample size has to be considered and the next step should be applying the treatment protocol in a representative sample of individuals.

REFERENCES


Figure 1. Average, standard deviation and significance level before and after treatment in relation to the number of words chosen (NWC), category sensory (S), affective (A), subjective evaluation (AS), mixed (M) and total (T)
INTRODUCTION

Bruxism parafunction which is manifested by grinding or clenching the teeth, or a combination of both. Diabetes Mellitus (DM) type 2 is a pathology that affects 7% of the general population, with half of the diabetic patients had peripheral neuropathy, distal sensory-motor, the main cause of skin ulcers that do not heal and amputation of feet and limbs. Auricular acupuncture is a technique that is part of Traditional Chinese Medicine (TCM), in which the pinnas reflects the physiological changes of the body at specific points to be stimulated to assist in restoring health. The objective of this study was to evaluate the effect of auriculotherapy on the symptoms of bruxism and to control blood glucose and polyneuropathy in a patient with type II DM.

METHODS

Patient AC, white, female, 48, 78kg, Body Mass Index (BMI = 29.4), attended the Acupuncture Clinic of the Piracicaba Dental School/UNICAMP, with the chief complaint of daytime and night teeth clenching. Featuring painful paresthesia in the legs and feet, peripheral neuropathy attributed to sensory-motor distal axonal and myelin, present since the beginning of the diagnosis of type 2 diabetes, 6 years ago. The patient was auriculotherapy every Friday, for three months, using mustard seeds secured with tape beige brand Cremer, who remained in place for four days, stimulated three times a day (morning, afternoon and evening) by the patient. Used ear points: Shen-Men, Kidney, Endocrine, Heart, Gall Bladder, Spleen and Vagus Nerve.

To observe the effects of auriculotherapy in polyneuropathy held an electroumeuromyography and surface electromyography before and after treatment, both held in the morning.

The electroneuromyography was as performed using the device Nihon Kohden, the two channels. The conduction velocity and sensory motor were carried out with electrodes of the silver surface. Electroneuromyography traces (Figure 1) were performed with needle electrode coaxial disposable. To use this entry to filter low frequency of 10 Hz and a high frequency of 10,000 Hz.

To collect the EMGs data (Figure 2), we used the device Lynx Electronics Ltda 8-channel, with disposable surface electrodes. We followed the international standards recommended by ISEK and SENIAM. We used a low pass filter 20 Hz and 500 Hz high-pass.

Tests of blood glucose monitoring, using the system automedicação One Touch Ultra 2 (Johnson & Johnson Medical), with serial measurements of blood glucose weekly after 8 hours of fasting and weekly weight control, to check the effects of auriculotherapy in control the rate of reduction of plasma glucose and body weight.

RESULTS AND DISCUSSION

The patient reported that treatment with the perception of dental clenching improved significantly, there was a clear improvement of the physical layout, felt more dynamic, less physical fatigue, improved nighttime paresthesia in the feet and lower limbs with better sleep quality. By stimulating the reflex areas corresponding to affected organs, located in the ear to stimulate the ear points Shen-Men, Heart and Kidney obtained the decreased perception of bruxism, because these points together with Gall Bladder, Spleen / Pancreas have their effects magnified (Yamamura, 2004), working in the management of anxiety and stress, which may contribute to the onset of clenching and / or grinding of teeth.

There was a reduction in body weight and that may have contributed to this result was the reduction of anxiety (emotional factors) and balance the energy meridian Spleen / Pancreas achieved with auriculotherapy. BMI decreased from 29.4 to 27.6 but kept in obesity class I, but showed improvement.

According to test blood glucose was observed differences in glucose levels, indicating a reduction of the same results, indicating that the point Vagus nerve may be useful in reducing blood glucose, as reported by Cai, 2011, in this case associated with Endocrine points, Gallbladder and Spleen/ Pancreas.

CONCLUSION

In this clinical case, the use of auriculotherapy was an instrument of health benefits provided in oral and general health, especially in glycemic control and reducing the perception of polyneuropathy can be recommended for similar cases.

REFERENCES

EFFECT OF INFORMATION IN VISUAL STANDARD FREQUENCY OSCILLATION OF BODY CHRONIC HEMIPARESIS

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INTRODUCTION

In patients with chronic hemiparesis, observed alterations in the ability to remain standing in the upright posture. You can check for changes in sensory and especially the integration of the higher centers. Thus, hemiparesis causes limitations in performing functional activities such as changing position in bed, sitting and walking which are motor actions and where mobility is also necessary to performance of the postural control system consists of sensory and motor structures to promote the organization body suitable for the task, enabling more efficient movement.

Hemiparetic patients have an inability to maintain the stability, observing changes in the support base, and an increased area, the amplitude and frequency of oscillation of the mass center, making them more vulnerable to fall and more dependent on feedback remaining sensory. The present study aims to determine in patients with stroke, the interference of visual information about the frequency of body sway.

METHODS

We evaluated 12 patients with chronic hemiparesis, from a year of full involvement with hemiparesis or crural predominance due to stroke. The evaluation of the posture control hemiparetic was performed by measuring the oscillation frequency (FR) from the center of mass of these patients. These variables of postural control were captured by a force platform brand CEFISE Sports® Biotechnology, model square, with an acquisition frequency of 100Hz.

The hemiparetic patients were submitted to two different postural vertical real estate, semi-tandem and bipedal. In each situation, patients underwent three measurements of 30 seconds on the platform consecutively, without leaving the position. Initially, the data were tabulated in Statistical Package for Social Science (SPSS) in version 18.0, for descriptive and inferential analysis. Established as an independent variable the visual condition, open eye and closed eye. The dependent variable FR. We used the paired t-test to verify the differences and adopted an α ≤ 0.05 as a way to avoid a false-positive error. The research was released by the Ethics Committee of UEPB (protocolo 04363.0.133.000-09).

RESULTS AND DISCUSSION

Figure 1 shows that the visual information are not determining the frequency that the center of mass of hemiparetic patients are teetering (t = 0.38, p = 0.49).

Yelnik et al. (2005), inferred that such a relationship comes to visual influence of the preconditions to stroke and not the injury caused (Cremieux and Mesure, 1994; ISABLEU et al., 2003). However, these authors assessed visual dependence of postural control in acute hemiparetic patients, the chronic patient may present different aspects.

CONCLUSION

The frequency of oscillation body hemiparetic patients chronic not proved to be determined by visual information.

REFERENCES

INTRODUCTION

Muscle training is widely used by physiotherapists and physical education professionals on healthy or injured individuals training. When prescribing such exercises, rest period is a fundamental variable for successful development of the proposed program.

An inadequate rest may cause muscle fatigue, which may lead to decline in force generating ability\(^1\), as well as a reduction in median frequency (\(F_{med}\)) parameters, identified by electromyography\(^2\). However, the literature does not indicate how rest period influences the \(F_{med}\), after muscle fatigue protocols. As such, this study aims to evaluate the effect of different rest periods following induced muscle fatigue on quadriceps femoris electromyographic activity, in healthy individuals.

METHODS

This is a controlled, randomized, blind clinical trial conducted in the Neuromuscular Performance Analysis Laboratory (LAPERN) of the Department of Physiotherapy of the Federal University of Rio Grande do Norte (UFRN), in Natal, Brazil. Subjects for this study included 64 healthy volunteers, of both genders, with an average age of 21.8 ± 1.7 years and mean body mass index of 24.2 ± 3.7 Kg/m². Subjects were randomly assigned into four distinct groups: control group (CG – no induced fatigue); experimental group 1 (EG 1 – one minute of rest after fatigue); experimental group 3 (EG 3 – three minutes of rest after fatigue); and experimental group 5 (EG 5 – five minutes of rest after fatigue).

We used a 4-channel signal conditioning module (SCM 1000 – EMG System®, Brazil) with an analog-digital converter – A/D (CAD, 12/36-60K), with 12 bit resolution. The equipment has a common-mode rejection ratio (CMRR) > 80 Db and sampling frequency of 2000 Hz and the signal was filtered between 20 and 500 Hz, being amplified 1000 times. We used EMGLab software (EMG System®, Brazil), which calculates median frequency using the Fast Fourier Transform (FFT).

Self-adhesive single differential electrodes with an inter-electrode distance of 2 cm (Noraxon®, USA) were applied, in addition to a self-adhesive reference electrode (Noraxon®, USA). Furthermore, we used an isokinetic dynamometer (Biodex Multi-Joint System® 3 Pro, USA).

For the electromyographic evaluation, electrodes were positioned over the belly of Rectus Femoris (RF), Vastus Lateralis (VL) and Vastus Medialis (VM) in accordance with SENIAM recommendations. The reference electrode was attached to the tibial tuberosity.

Subjects realized an initial assessment which consisted of 5 flexion/extension concentric knee isokinetic contractions at 60°/s. Participants were then submitted to a muscle fatigue protocol (30 flexion/extension concentric knee contractions at 60°/s) and reassessed as initially described.

RESULTS AND DISCUSSION

The dynamometric fatigue index did not vary between experimental groups (\(p = 0.076\)). Intrigroup differences were observed for the analyzed variables, as shown on Table 1. No intergroup differences were observed.

Muscle fiber composition for the evaluated muscles plays an important role in ratio values of \(F_{med}\) and its recovery. The literature reports a larger proportion of type II fibers in the rectus femoris, followed by the vastus lateralis and with vastus medialis having the greatest number of type I fibers\(^3\). Type II fibers are more easily fatigued when compared to type I fibers\(^4\).

No studies were found using a similar methodology or that analyzed median frequency recovery of the quadriceps femoris as a function of resting time after induced fatigue. When considering the rest period, slow twitch fibers require shorter intervals due to their oxidative characteristics, while fast twitch fibers need longer recovery times owing to their glycolytic characteristics\(^5\). This was corroborated in our study, since the VM recovered with 3 minutes and the VL with 5 minutes, whereas the RF did not reestablish its frequency parameters, irrespective of the rest time adopted.

CONCLUSION

Results in the present study suggest that applying a three-minute rest, although not enough to restore all the electromyographic variables, enabled participants to recover force production capacity, for this muscle group.

REFERENCES


Table 1. Mean and standard deviation of the analyzed variables pre and post induced fatigue.

<table>
<thead>
<tr>
<th>Variable</th>
<th>CG</th>
<th>EG 1</th>
<th>EG 3</th>
<th>EG 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>(F_{med}) RF</td>
<td>124.1 (± 14)</td>
<td>122.6 (± 14)</td>
<td>121.7 (± 13.4)</td>
<td>121.1 (± 12.8)</td>
</tr>
<tr>
<td>(F_{med}) VL</td>
<td>105.7 (± 17.2)</td>
<td>104.2 (± 17.2)</td>
<td>109.7 (± 13.4)</td>
<td>104.5 (± 12.8)</td>
</tr>
<tr>
<td>(F_{med}) VM</td>
<td>93.4 (± 24.6)</td>
<td>89.6 (± 24.6)</td>
<td>91.1 (± 23.5)</td>
<td>85.2 (± 21.6)</td>
</tr>
<tr>
<td>PT/BW</td>
<td>252.3 (± 66.6)</td>
<td>261.7 (± 64.2)</td>
<td>267.8 (± 52.2)</td>
<td>238.7 (± 45.1)</td>
</tr>
</tbody>
</table>

\(p < 0.05\) * \(p < 0.01\)
INTRODUCTION
The gait pattern is altered after fatigue (Granacher et al., 2010). Muscle fatigue can cause changes in proprioception, coordination and reaction time, which are important components to gait control. The loss of balance during walking can also be related to fatigue, increasing the falls risky, especially in the elderly (Helbostad et al., 2007). Furthermore, the aging process causes muscle and bone losses, which may affect the gait pattern and decrease the balance, being necessary adjustments during the gait (Christofoletti et al., 2006). The aim of this study is to analyze the effect of muscle fatigue on the gait of older adults.

METHODS
Eight older adults men participated in the study (age – 75.55±4.11 years; 1.68±0.26m; 71.54±14.67kg). The participants walked over an 8m pathway, at self-selected speed. Each participant performed three trials before and after muscle fatigue (MF). Electromyography signal was recorded by an biological conditioner (sample rate - 2000Hz) with eight channels (EMG System do Brazil Ltda.). The surface electrodes were placed in the muscles vastus laterallis (VL), vastus medialis (VM), biceps femorals (BF), lateral (LG) and medial (MG) gastrocnemius and anterior tibialis (AT) of the right limb. The signals acquisition followed the ISEK/SENIAM recommendations. The data were filtered with high pass Butterworth 4th order and band pass filter 20-500Hz. Moreover, the acquisition of kinematic gait parameters was accomplished with a three-dimensional optoelectronic system (OPTOTRAK Certus), using a sample rate of 100 samples/s. Kinematic data were filtered with a 5th order low-pass filter with cutoff frequency of 6Hz. The data acquisition systems were electronically synchronized. The following parameters of the central stride of the each trial were analyzed: RMS, peak EMG activity and muscle activation latency (time of onset of muscle activation to the peak), muscular co-activation index, length, width, single support, double support and stride duration and velocity. The RMG parameters were normalized by peak EMG activity in the central stride for each participant. Before and after muscle fatigue was performed maximum voluntary isometric contractions (MVC) by a Leg Press device coupled of a load cell (EMG System do Brazil Ltda.) with precision of 0.1Kgf.

RESULTS AND DISCUSSION
The Test-t paired indicated higher RMS of the VL (p < 0.007), peak muscle activity of the VM (p < 0.01) and muscular co-activation index of BF/VL (p < 0.001) after muscle fatigue (Table 1). For muscle activation latency, the AT (p < 0.001) and the VM (p < 0.04) showed lower values after muscle fatigue. For the spatiotemporal parameters, the Test-t paired indicated greater stride length (p < 0.05), width (p < 0.03) and velocity (p < 0.001) and shorter stride duration (p < 0.001) after muscle fatigue. The older adults needed to increase stability after muscle fatigue. Due to the loss of motor control, the older adults increased the muscle co-contraction and muscular activity to maintain performance on the task. Moreover, the older adults anticipated the muscle activation to prevent falls during walking. Besides, the older adults improved their balance during walking, increasing the stride width and velocity and decreasing the stride duration (Hof et al., 2005).

CONCLUSION
In order to prevent falls during the gait after muscle fatigue, the older adults improved joint stability and also the balance during walking.

REFERENCES

Table 1. Mean values and standard deviation of the RMS, the peak EMG activity (PEAK) and muscle activation latency (LAT) of the muscles VL, BF, LG, MG, AT and VM, the spatiotemporal parameters, the index of muscle co-contraction, and the MVC. * Difference between pre and post muscle fatigue.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>PRE FATIGUE</th>
<th>PÓS FATIGUE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RMS(%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VL</td>
<td>22.0±6.5</td>
<td>21.9±6.5</td>
</tr>
<tr>
<td>BF</td>
<td>87.8±12.9</td>
<td>87.7±12.9</td>
</tr>
<tr>
<td>LG</td>
<td>24.8±7.5</td>
<td>24.9±7.6</td>
</tr>
<tr>
<td>AT</td>
<td>22.8±5.7</td>
<td>23.6±5.6</td>
</tr>
<tr>
<td><strong>PEAK(%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VL</td>
<td>86.2±13.9</td>
<td>86.3±13.9</td>
</tr>
<tr>
<td>BF</td>
<td>78.4±14.6</td>
<td>78.3±14.7</td>
</tr>
<tr>
<td>LG</td>
<td>23.9±9.7</td>
<td>23.9±9.7</td>
</tr>
<tr>
<td>AT</td>
<td>27.8±17.0</td>
<td>27.8±17.0</td>
</tr>
<tr>
<td><strong>LAT(ms)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VL</td>
<td>1.0±0.7</td>
<td>1.0±0.7</td>
</tr>
<tr>
<td>BF</td>
<td>0.8±0.0</td>
<td>0.8±0.0</td>
</tr>
<tr>
<td>LG</td>
<td>0.2±0.1</td>
<td>0.2±0.1</td>
</tr>
<tr>
<td>AT</td>
<td>1.0±0.1</td>
<td>1.0±0.1</td>
</tr>
</tbody>
</table>

**Spatiotemporal parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>PRE FATIGUE</th>
<th>PÓS FATIGUE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Length(cm)</strong></td>
<td>129.9±15.4</td>
<td>129.2±15.7</td>
</tr>
<tr>
<td><strong>Width(cm)</strong></td>
<td>10.2±2.0</td>
<td>10.2±2.0</td>
</tr>
<tr>
<td><strong>Duration(s)</strong></td>
<td>1.0±0.1</td>
<td>1.0±0.1</td>
</tr>
<tr>
<td><strong>Velocity(cm/s)</strong></td>
<td>120.0±15.1</td>
<td>120.0±15.1</td>
</tr>
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</table>

**Co-Contraction**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>PRE FATIGUE</th>
<th>PÓS FATIGUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>BF/VL*</td>
<td>1.0±0.0</td>
<td>1.0±0.0</td>
</tr>
<tr>
<td>LG/AT*</td>
<td>1.0±0.0</td>
<td>1.0±0.0</td>
</tr>
</tbody>
</table>

**MVC (kgf)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>PRE FATIGUE</th>
<th>PÓS FATIGUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MVC</td>
<td>214.3±37.4</td>
<td>192.2±35.7</td>
</tr>
</tbody>
</table>
EFFECT OF THE STRAIN-COUNTERSTRAIN TECHNIQUE ON THE THRESHOLD OROFACIAL PAIN IN WOMEN WITH TEMPOROMANDIBULAR DISORDER

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INTRODUCTION

The temporomandibular disorder (TMD) can be defined as the set of signs and symptoms manifested itself not only in the temporomandibular joint (TMJ) and masticatory muscles, but throughout the stomatognathic system1. Pain is the main reason that leads patients to seek help from an expert, especially pain in the TMJ and masticatory muscles. A very common alteration in the masticatory muscles of TMD patients is the presence of myofascial trigger points (MTP)1,2, causing local and/or referred pain in the face and head3. Among the various techniques of treatment for MTP described, the Strain-Counterstrain technique has become known for its effectiveness and easy to use2,4, but few studies evaluate its effects on the masticatory muscles and in symptomatic patients. The aim of this study was evaluate the effects of Strain-Counterstrain technique on the pressure pain threshold (PPT) in patients with TMD.

METHODS

The study was conducted at John Basmajian Electromyography Lab’s in Piracicaba Dental School/State University of Campinas. The sample consisted of 8 women (27.25±1.75 years), diagnosed with TMD, through the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) performed by a calibrated examiner. All patients were treated with the Strain-Counterstrain technique for MTP described by Ricard F. (2005) which consist of: with the patient on supine position, locate the MTP and hold pressure on it causing local and/or referred pain, so tolerable to the patient, and with the other hand seek to a jaw position that will decrease or disappear the pain. The pressure is maintained constantly for 90 seconds, then returning in a passive and slow way to the initial rest position of the jaw. The patients underwent 4 sessions (1 time/week) and the following muscles were treated: right masseter (RM) and left (LM), right anterior temporal (RAT) and left (LAT), right middle temporal (RMT), and left (LMT), right posterior temporal (RPT) and left (LPT), suprahyoids. The evaluation, localization and treatment of MTP were performed at each session by an experience examiner. The evaluation of the PPT was used the digital algometer (KRATOS-DDK), which was applied the following regions: right TMJ (RTMJ) and left (LTMJ), RM, LM, RAT, LAT, RMT, LMT, RPT, LPT, before (B) and immediately after the first session (IA) and 24 hours after the fourth and last (AL) treatment. The Shapiro-Wilk test was applied for the statistical analysis, followed by the t test for paired data, considered the critical level of p<0.05. Analyses were performed in the BioStat 5.0.

RESULTS AND DISCUSSION

The analysis showed a significant increase of PPT on the regions studied in various situations as show in figure 1 and 2. The Strain-Counterstrain aims to inhibit the hyperactivity of the gamma motor neurons, thus promoting a decrease in muscles tone and symptoms of patient2, justifying the findings in this study.

CONCLUSION

The results indicate that the Strain-Counterstrain technique can be used as a treatment for relief of pain in patients with TMD.

REFERENCES


ACKNOWLEDGMENT

We would like to acknowledge CAPES for the financial support.
INTRODUCTION

The Nintendo Wii was developed in 2005 with the purpose of changing the profile of inactive players for a more dynamic profile (SOUZA, 2010). The games most commonly used for training, treatment and rehabilitation are those that you interact all the time, such as Wii Sports which includes tennis, bowling, boxing, golf and baseball. With the Wii is an improvement of visual perceptions, balance and functional mobility, thus helping the individuals in the performance of motor tasks, activities of daily living and practical life (GRAVES et al., 2008, Dias et., 2009; TAYLOR et al., 2011). Moreover, it is a resource differential, it does not use traditional materials of Physiotherapy. Despite these findings, not yet know the effect of the Wii in hand grip strength. The objective of this study was to evaluate maximal isometric force and sustained handgrip in healthy subjects before and after intervention with the game of tennis in Wii Sports.

METHODS

After approval by CEP-UFTM Protocol (1909), participated in the study 12 healthy college volunteers aged between 18 and 25 years of both genders with no history of joint injury or muscle in the upper limbs and without complaint of musculoskeletal pain on evaluations and interventions. We performed an initial evaluation of maximal isometric strength of handgrip and isometric force sustained (Figure 1 and 2) for 10 seconds through the dynamometer grip E-link model H500 Biometrics ®. For the measurements of force, the volunteers remained seated, the shoulder adducted, elbow flexed at 90 degrees and the forearm sustained and in a neutral position. After the initial evaluation, volunteers played tennis for 10 sessions of 30 minutes (three times for week) using only the right upper limb. The variables studied were the average of three repetitions of maximal isometric strength and average of last 60% of the curve values sustained for 10 seconds before the first and after the last intervention with the Wii. The data of maximum force and sustained without normal distribution and the Wilcoxon test was used with a significance level of 5%.

RESULTS AND DISCUSSION

The minimum, median and maximum values of the forces before and after training are presented in Table 1. After training with the tennis on the Wii was an increase in the maximum strength but this increase was not significant. For the last 60% of sustained strength an increase in relation to minimum values and a reduction in median. The fall in the values of the last 60% may represent a state of fatigue. No significant difference was found for all variables analyzed (Table 1). Zatsiorsky (2004) reports that so that there is an increase in muscle strength training should be performed with a load in order to provoke tension in the muscle, thus increasing muscle strength. In our study, the volunteers held only a lightweight control, and performed training did not emphasize the progressive load to the muscles of the grip, not occurring changes in muscle strength.

CONCLUSION

This study was not found significant gain maximum strength and sustained grip.

REFERENCES

EFFECT OF THREE MUSCLE STRETCHING TECHNIQUES ON TORQUE AND ELECTROMYOGRAPHIC ACTIVITY

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INTRODUCTION

Muscle stretching is widely used in many areas. However, many studies suggest that stretching provokes acute alterations on the muscle properties, in addition to not preventing lesions1. Thus, the aim of the present study was to assess the acute effect of three of the main stretching techniques used in sport and rehabilitation on passive torque and electromyographic (EMG) activity. The study sought to simulate how these techniques are applied in daily practice, in order to contribute to the understanding of the neurophysiological and biomechanical aspects related to muscle stretching.

METHODS

Sixty sedentary healthy women, mean age of 22.6 years, were randomly allocated to 4 groups of 15 subjects each: Control Group (CG), Static Stretching Group (SG), Hold-Relax Stretching Group (HRG) and the Stretching Group using the Hold-Relax-Agonist technique (HRAG) (Figure 1).

An assessment was performed before and after intervention to verify passive peak torque (PT) and EMG2 activity of the hamstrings. EMG activity of the femoral biceps (FB) and of the semitendinous (ST) muscles was recorded simultaneous with the assessment of passive PT on the isokinetic dynamometer.

During assessment of passive torque, EMG activity was recorded during the 45 seconds in which the knee was passively extended. For statistical purposes, we recorded the root mean square (RMS) value (in μV) of the first five seconds and of the last five seconds, for each muscle.

Inferential statistics was carried out using intra and intergroup tests, at a significance level of 5% (p<0.05).

RESULTS AND DISCUSSION

The results of the present study suggest that: 1) muscle stretching may provoke an acute increase in passive torque, depending on the maneuver used; 2) there is not found EMG activity alterations during the assessment of passive torque.

There is a phenomenon known as “passive force enhancement” (PFE), which can be observed in the muscle tissue after stretching, even after interruption of the stimulus. According to the PFE theory, there was no increase in the passive PT of the HRG due to the effect of the contraction of the stretched muscle. Lieber (2002) suggests that titin would be the start of a system that regulates the organization of sarcomeres in series, so as to maintain the ideal length/tension relation.

In relation to the effect of stretching on EMG activity, we not found studies. However, a systematic review found a reduction in this activity during assessment of active torque.

A limitation of this study was not checking the range of movement of the knee to compare the acute effect caused by stretching techniques.

CONCLUSION

The results showed that short-duration stretching: 1) provokes an acute increase in passive torque, except in the Hold-Relax Group; 2) does not provoke alterations in either EMG activity. These findings suggest that muscle stretching in young and sedentary women can alter the passive muscle properties. It is possible that these changes are related to muscle response to injury risks. However, other studies should be conducted to assess this risk.

ACKNOWLEDGMENT

The authors thank CNPq for the financial support.

Table 1: Passive PT pre- and post-stretching.

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre (Nm)</th>
<th>Post (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG</td>
<td>26.0 ± 2.6</td>
<td>24.4 ± 2.8*</td>
</tr>
<tr>
<td>SG</td>
<td>25.8 ± 4.2</td>
<td>28.0 ± 4.1*</td>
</tr>
<tr>
<td>HRG</td>
<td>29.8 ± 6.9</td>
<td>28.7 ± 7.8</td>
</tr>
<tr>
<td>HRAG</td>
<td>26.1 ± 2.4</td>
<td>28.0 ± 3.2*</td>
</tr>
</tbody>
</table>

*a p<0.05 ; Nm: Newton x meter

Table 2: Electromyographic activity (RMS) during assessment of passive torque.

<table>
<thead>
<tr>
<th>Group</th>
<th>Muscle</th>
<th>Pre (μV)</th>
<th>Post (μV)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Start (μV)</td>
<td>End (μV)</td>
</tr>
<tr>
<td>CG</td>
<td>FB</td>
<td>13.5 ± 0.3</td>
<td>13.5 ± 0.2</td>
</tr>
<tr>
<td></td>
<td>ST</td>
<td>11.8 ± 0.2</td>
<td>11.9 ± 0.4</td>
</tr>
<tr>
<td>SG</td>
<td>FB</td>
<td>13.5 ± 0.4</td>
<td>13.6 ± 0.5</td>
</tr>
<tr>
<td></td>
<td>ST</td>
<td>11.7 ± 0.3</td>
<td>11.8 ± 0.3</td>
</tr>
<tr>
<td>HRG</td>
<td>FB</td>
<td>13.6 ± 0.4</td>
<td>13.6 ± 0.4</td>
</tr>
<tr>
<td></td>
<td>ST</td>
<td>11.8 ± 0.3</td>
<td>12.0 ± 0.7</td>
</tr>
<tr>
<td>HRAG</td>
<td>FB</td>
<td>13.4 ± 0.1</td>
<td>13.3 ± 0.1</td>
</tr>
<tr>
<td></td>
<td>ST</td>
<td>11.6 ± 0.2</td>
<td>11.6 ± 0.2</td>
</tr>
</tbody>
</table>

a,b,c,d Equal letters correspond to the difference between the respective variables.
EFFECT OF VISUAL INFORMATION IN THE AREA OF SWING STANDARD BODY CHRONIC HEMIPARESIS

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INTRODUCTION

In patients with chronic hemiparesis, observed alterations in the ability to remain standing in the upright posture. You can check for changes in sensory and especially the integration of the higher centers. Thus, hemiparesis causes limitations in performing functional activities such as changing position in bed, sitting and walking which are motor actions and where mobility is also necessary to performance of the postural control system consists of sensory and motor structures to promote the organization body suitable for the task, enabling more efficient movement. Hemiparetic patients have an inability to maintain the stability, observing changes in the support base, and an increased area, the amplitude and frequency of oscillation of the mass center, making them more vulnerable to fall and more dependent on feedback remaining sensory. The present study aims to determine in patients with stroke, the interference of visual information about the area of body sway.

METHODS

We evaluated 12 patients with chronic hemiparesis, from a year of full involvement with hemiparesis or crural predominance due to stroke. The evaluation of the postural control hemiparetic was performed by measuring the total area of oscillation (ATO) from the center of mass of these patients. These variables of postural control were captured by a force platform brand CEFISE® Sports Biotechnology, model square, with an acquisition frequency of 100Hz. The hemiparetic patients were submitted to two different postural vertical real estate, semi-tandem and bipedal. In each situation, patients underwent three measurements of 30 seconds on the platform consecutively, without leaving the position. Initially, the data were tabulated in the Statistical Package for Social Science (SPSS) in version 18.0, for descriptive and inferential analysis. Established as an independent variable the visual condition, open eye and closed eye. The dependent variables were indicators of postural control: VMO and ACT. We used the paired t-test to verify the differences and adopted an α ≤ 0.05 as a way to avoid a false-positive error. The research was released by the Ethics Committee of UEPB Protocol (04363.0.133.000-09).

RESULTS AND DISCUSSION

The ATO (Figure 1) did not show to be influenced by the visual information (t = 0.48, p = 0.63). In contrast, the literature shows that the change in the oscillation area leads to an increased need for more precise adjustments posture by the patient sequel. A plausible explanation is not only the inefficiency of neuromuscular function to perform the execution of the strategy of the ankle, but the rheological changes of soft tissue makes the maintenance of posture loss and insecure, which make them totally prone to falls and their complications trauma-orthopedic.

CONCLUSION

We inferred from this study that the vision does not influence the ATO group of individuals analyzed.

REFERENCES

EFFECTIVENESS OF VIRTUAL REALITY USING WII GAMING IN THE TREATMENT OF CEREBRAL PALSY

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INTRODUCTION

Virtual reality is defined as an immersive, interactive, 3-dimensional computer experience occurring in real time. This system has been developed specifically for rehabilitation of upper-extremity use, lower-extremity training and gait retraining. The aim of this report is to evaluate and describe the feasibility and efficacy of using virtual reality system for individuals with cerebral palsy.

METHODS

This is a longitudinal, randomized and single-blinded clinical trial. It was selected 20 patients with spastic diplegic cerebral palsy and a Gross Motor Function Classification System level II and III for this study, but only 14 patients could continue in study because the inclusion criteria. The 14 patients were randomized in two groups: 8 participated in the intervention group and 6 in the control group. During the study 5 patients were excluded due to therapeutic change. Thus 9 patients concluded the study, 6 in the intervention group and 3 in the control group (mean age 7.11 years). All patients were evaluated before and after using GMFM (Gross Motor Function Measure), SAPO (An Postural Assessment System) and surface electromyography (EMG) of rectus femoris, biceps femoris and gluteus maximus. All patients were submitted to 20 sessions of 40 min 2x/week of stretching and strengthening the lower limbs. In the intervention group were added 20 minutes supervised of activities using the Nintendo Wii Fit (games: soccer, balance bubble, basic step, rowing squat and table tilde). A child in the study completed only 12 sessions due the application of botulinum toxin. This study was conducted at the rehabilitation center AACD.

RESULTS AND DISCUSSION

Bioestatic 5.0 was used for data analyses. The normality test sample and Wilcoxon test were used for statistical analysis. There was not statistical difference in both groups in the evaluation of GMFM. The Electromyography in the group using virtual reality presented significant improvement in the rectus femoris (P= 0.05) and a trend of improvement in the biceps femoris and gluteus maximus (P= 0.08). In the control group there was not statistical difference in the biceps femoris and gluteus maximus (P= 0.31) (P= 0.18), but the rectus femoris muscle showed a trend statistical difference to decrease in muscle activity (P= 0.07). The SAPO in the intervention group there was statistically significant improvement in knee popliteal angle variables R (p=0.002) and L (P=0.053) and alignment of anterior superior iliac spine (p=0.001). Meanwhile in the control group there was no statistically significant difference in the popliteal angle R (p=0.34) and L (p=0.23), but there was a trend of improvement in the alignment of anterior superior iliac spine and acromion (p=0.08).

CONCLUSION

The study suggests that for the sample studied the utilization of virtual reality with video game promoted a better muscular recruitment and postural pattern when compared with the child who did not use the feature. Despite the small sample size the study can show the benefits of using the virtual reality with video game – Nintendo Wii in therapy.
EFFECTS OF AGE ON THE DYNAMIC BALANCE

INTRODUCTION

The control of balance requires the maintenance of center of gravity over support base during static and dynamic situations. This process occurs effectively by action, mainly of the vision, vestibular and somatosensory systems. With aging, these systems are affected and some parts of postural control can be suppressed. This can decrease the compensatory capacity of the system and generate instability (Ruwer et al., 2005). Therefore, our purpose was to evaluate the effects of the age on dynamic balance in three age groups.

METHODS

The study included sixty individuals of both genders, divided, according to age, in three groups of 20 individuals each. Group 1 was composed of young people (11 men and 9 women; 22.25±2.15 years old, 65.88±15.20 kg, and 1.68±0.11m); group 2 was composed of middle aged individuals (9 men and 11 women; 50.80±6.10 years old; 70.07±11.50 kg, and 1.62±0.09 m); and group 3 was composed of elderly individuals (8 men and 12 women; 67.35±5.45 years old; 68.42±10.85 kg; and 1.56±0.09 m). In order to register the dynamic balance, individuals were evaluated by Timed Up and Go Test (TUGT) - Figure 1A, and Berg Balance Scale (BBS) – Figure 1B, chosen at random (www.randomization.com). It was used the SPSS – 15.0 for statistical analysis. Initially, tests for normality (Shapiro Wilks) and homogeneity of variances (Levene) were used. Two univariate analysis (ANOVA – one way) were employed to compare the average times of TUGT and BBS scores between the three groups. Tukey post-hoc tests were employed, and the significance level of 5% was adopted, in all comparisons.

RESULTS AND DISCUSSION

ANOVA ( ) revealed differences between groups for TUGT and BBS (P<0.01). For both, according to Table 1, Tukey post-hoc test indicated difference between groups 1 and 3, and groups 2 and 3 (P<0.01). However, did not difference between groups 1 and 2 (P=0.172 and P=0.456) respectively.

Table 1: Comparison of means of TUGT and BBS between the groups

<table>
<thead>
<tr>
<th>Variables</th>
<th>Youngsters</th>
<th>Midle-aged</th>
<th>Elderly</th>
</tr>
</thead>
<tbody>
<tr>
<td>TUGT (s)</td>
<td>6.6±1.0a</td>
<td>7.4±1.4b</td>
<td>8.9±1.7ab</td>
</tr>
<tr>
<td>BBS (points)</td>
<td>55.8±0.4a</td>
<td>55.3±1.0b</td>
<td>53.9±2.0ab</td>
</tr>
</tbody>
</table>

Note: same letters (significant difference; P<0.01)

Our results show that the age contributes for differences on the dynamic balance. In a review article, Figueiredo et al. (2007) showed that the evaluation of dynamic balance in elderly individuals, with validated tools (TUGT and BBS), is necessary into prevention and physical therapy intervention.

Although our data have showed that group 3 (elderly individuals) spent more time to walk 6 m during the TUGT and had less score in BBS, according to Abreu and Caldas (2008), who studied the correlation between gait speed, balance, and age, it is evident that, regardless of a good level of balance, the gait speed decreased with age, both in practitioner and non-practitioner of exercise program.

According to Ricci et al. (2009), as aging, the sensory systems responsible for postural control (vision, somatosensory, and vestibular) are affected by decreased of functional reserves of elderly and/or by disease that affects frequently this age group, predisposing the individual to body imbalance and falls.

In other study, Silva et al. (2008) found differences for TUGT, but they did not find differences to BBS, when they compared one elderly group practicing of resisted exercise (24 weeks) with one control group.

CONCLUSION

The results showed that the dynamic balance changed with age, in the age groups evaluated.

REFERENCES

**EFFECTS OF CERVICAL MANIPULATION ON THE ELECTROMYOGRAPHIC SIGNAL OF UPPER TRAPEZIUS**

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**INTRODUCTION**

Chiropractic presents as a manual treatment that, by proprioceptive joints adjustments, may be capable to provide muscle activity modifications. (VASCONCELOS, 2008). Thus, we may conclude that the cervical chiropractic manipulation would change the muscles electromyographic activity with close relation with this zone.

Some studies has shown the vertebral manipulations effects on the muscle activity (BRONFORT et al., 2004), however, with no confirmation from the real for such effects promoted. The purpose of this research was to analyze the immediate effect from the global chiropractic manipulation on cervical region shown by the electromyographic signal from the upper trapezius in healthy people.

**METHODS**

This is a quantitative research type, with a descriptive approach and transversal exploratory, been previously approved by the ethics committee of Faculdades Integradas de Patos – FIP. Fifteen females volunteers participated in this research, asymptomatic for cervical pain. For the electromyographic analyses was used the electromyography system (EMG) Miotool 400® surface, disposable electrodes Ag/AgCl MEDITRACE™. The parameters of electrode placement followed the proposed rules Surface Electromyography for the Non-Invasive Assessment of Muscles (SENIAM, 2012). The upper trapezius muscle was evaluated by the voluntary isometric maximum contraction before and after chiropractic manipulation.

The results were analyzed in a descriptive and inferential manner by the SPSS® 13.0 using the Shapiro-Wilk’s Normality Test, Student’s t-test paired data, adopting a level of significance of 5% for acceptance of the null hypothesis.

**RESULTS AND DISCUSSION**

The sample was composed by volunteers with an average age 21.53 ± 1.1 old, average height 1.63 ± 0.07m, average body mass 56.7 ± 7.6 kg, body mass index 21.1 ± 1.9 kg/m2. In the Shapiro-Wilk’s test all these data were presented as being parametric.

In this study, the RMS and normalized RMS (RMSn) values had presented an increasing tendency after manipulation supporting the data on this research as shown in table 2.

**CONCLUSION**

We can conclude that the manipulative chiropractic has influenced electromyography activity in both timing and frequency dominance on the trapezius muscle, supposing that such procedure is capable to interfere on the neuromuscular activity on the respective muscle. The small number of the sample (n=15) is an important point to be considered, it maybe have limited the results’ significance. It’s necessary to carry out more research using the EMG surface with a larger group of sample, analyzing the same electromyographic study using a group of control.

**REFERENCES**


**Table 1** – Electromyographic signal in time domain.

<table>
<thead>
<tr>
<th></th>
<th>BEFORE</th>
<th>AFTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMS (μV)</td>
<td>60.43 ± 1.54</td>
<td>78 ± 1.84</td>
</tr>
<tr>
<td>RMSn (%)</td>
<td>14.4 ± 1.31</td>
<td>16.4 ± 1.48</td>
</tr>
<tr>
<td><strong>P</strong></td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

According to Maduro de Camargo et al. (2011), the median frequency (MF) values showed an increasing tendency after manipulation supporting the data on this research as shown in table 2.

**Table 2** – Electromyographic signal in frequency domain.

<table>
<thead>
<tr>
<th>FM (Hz)</th>
<th>STATISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average (X)</td>
</tr>
<tr>
<td><strong>Before</strong></td>
<td>60.55</td>
</tr>
<tr>
<td><strong>After</strong></td>
<td>71.25</td>
</tr>
</tbody>
</table>
INTRODUCTION

The Dual Task (DT) is a functional situation and a prerequisite for a normal life, allowing the individual to walk and direct his attention to motor and cognitive tasks. Factors such as falls, imbalance, and loss of independence during gait are often associated with DT and Parkinson’s disease (PD). The use of activities with DT in clinical practice should be considered as a determinant in the rehabilitation process.

The Gait Deviation Index (GDI) is a quantitative measure based on nine angular kinematic variables in order to quantify the functional limitations of gait. Therefore, the aim of this study was to investigate the impact of motor-cognitive DT during gait in individuals with PD through the GDI.

METHODS

After approval by the local ethics committee, 14 subjects with idiopathic PD, classified between levels 2 and 3 on the Hoehn & Yahr stage on the active cycle of drug forming the PD group (GDP) were selected. Control group (CG) was composed of nine healthy subjects with similar age. All subjects had to have scores on the Mini Mental State Examination (MMSE) ≥ 24.

Gait analysis was made by a passive infrared tridimensional analysis, comprising eight cameras and retro reflective markers (FALCON - Motion Analysis Corporation). Helen Heys’ biomechanical model was used to estimate the position of the segments and the joint centers during locomotion. Each volunteer was asked to walk in a comfortable speed and then was inserted into an arithmetic subtraction consecutive (“500-7”) test during gait. For each condition, six gait cycles were collected.

Kinematic data from the three-dimensional gait analysis were imported into a spreadsheet, where a mathematical routine was used to generate the GDI in different situations. Statistical analysis was performed using paired Wilcoxon test for each group according to the task considering p <0.05 for statistical significance.

RESULTS AND DISCUSSION

Only patients with PD had decreased performance during gait with DT observed reduction in GDI values (Table 1).

However, during simultaneous tasks, the response time to the cognitive task is reduced due to the increase in attention needed to perform the motor task, which results in the exacerbation of gait defects during the performance of a DT exercise among patients with PD.

CONCLUSION

We observed changes in gait performance of patients with Parkinson’s disease compared to healthy subjects.

REFERENCES

EFFECTS OF SENSORY SYSTEMS AND AGE IN POSTURAL BALANCE

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INTRODUCTION

The change in postural balance is an important functional limitation among the physiological changes of aging, which contributes to falls (Alferi; Moraes, 2008). Therefore, our purpose was to evaluate the influence of the sensory systems and age on postural balance in three age groups.

METHODS

The study included sixty individuals of both genders, divided, according to age, in three groups of 20 individuals each. Group 1 was composed of young people (11 men and 9 women; 22.25±2.15 years old, 65.88±15.20 kg, and 1.68±0.11 m); group 2 was composed of middle aged individuals (9 men and 11 women; 50.80±6.10 years old; 70.07±11.50 kg, and 1.62±0.09 m); and group 3 was composed of elderly individuals (8 men and 12 women; 67.35±5.45 years old; 68.42±10.85 kg; and 1.56±0.09 m). In order to register the postural balance, individuals were instructed to stand on the balance platform (EMG System, Brazil), wearing normal shoes on three support conditions (bipedal- BIP, single-limb on dominant limb – DL, and nondominant limb - NDL), randomly chosen. In each support condition, the individuals performed three trials of 30 seconds: 1) with total visibility (TV); 2) wearing 50% visibility glasses (partial vision–PV); and 3) wearing glasses that did not permit any visibility (absent vision–AV), also randomly chosen. SPSS – 15.0 was used for statistical analysis. The variables which were analyzed were: total displacement of center of pressure (TD), anteroposterior displacement (APD), and mediolateral displacement (MLD). One multivariate analysis (MANOVA) was employed, using group (3), support (3), and vision (3) as factors. Tukey post-hoc tests were employed, and the significance level of 5% was adopted.

RESULTS AND DISCUSSION

MANOVA revealed differences (P<0.01) for the three factors (group, support, and vision) for the three variables (TD, APD, and MLD). According to Table 1, Tukey post-hoc tests indicated that, regarding to the groups, group 2 showed greater TD than groups 1 and 3, and group 3 showed greater TD than group 1. Groups 2 and 3 showed greater APD than group 1. Group 3 showed greater MLD than groups 1 and 2, and group 2 showed greater MLD than group 1.

Regarding the support conditions, for the three variables, the displacements were greater during DL and NDL supports than during BIP support. Regarding the vision conditions, TD, APD, and MLD were greater during the AV and PV than during the TV condition. APD and MLD were greater during the AV than during PV.

MANOVA also revealed interaction between group and supports factors for TD (P<0.01); APD (P<0.01); and MLD (P<0.01). Table 2 shows that post-hoc tests indicated that group 1 showed greater TD during NDL support than during BIP support; and groups 2 and 3 showed greater TD during DL and NDL supports than during BIP support. Group 2 showed greater TD than group 1, only during DL support. In groups 2 and 3, APD was also greater during DL and NDL support than during BIP support. Groups 2 and 3 showed greater APD than group 1 during DL support, and group 3 showed greater APD than group 1 during NDL support. Groups 2 and 3 showed greater MLD during DL and NDL support than during BIP support, and group 3 showed greater MLD than group 1 during DL and NDL support. MANOVA revealed interaction between groups and vision factors for MLD (P<0.05). Post-hoc tests indicated that group 3 showed greater MLD during AV than during TV; and group 3 showed greater MLD than group 1 during AV and TV conditions (Table 2).

Our results show that postural balance changed during single-limb support, regardless of limb dominance, which agrees with Alonso et al. (2011). Moreover, the biggest displacements were observed in the middle-age and elderly groups.

Postural displacement also varied according to vision conditions. AV and PV conditions generated greater displacements, and the elderly showed greater MLD than the youngsters during AV and PV conditions, which is similar to the results of Regolin and Carvalho (2010).

CONCLUSION

This study showed that postural balance changed when sensory information of support and vision were manipulated, in the three age groups. However, these changes were more evident as age increased.

REFERENCES


ACKNOWLEDGEMENTS

Financial support of CNPq (Universal Announcement 2008).

Table 1: Displacement of center of pressure in the different conditions. The values are expressed in mean ± standard deviation. Some letters represent differences between conditions.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group</th>
<th>Support</th>
<th>Vision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Youngsters</td>
<td>Middle-aged</td>
<td>Elderly</td>
<td>BIP</td>
</tr>
<tr>
<td>TD (cm)</td>
<td>0.9±1.1a</td>
<td>1.3±1.4b</td>
<td>1.8±2.0c</td>
</tr>
<tr>
<td>APD (cm)</td>
<td>1.4±1.5d</td>
<td>2.5±2.0e</td>
<td>2.5±1.9e</td>
</tr>
<tr>
<td>MLD (cm)</td>
<td>2.6±1.7g</td>
<td>1.1±0.f</td>
<td>1.8±1.9</td>
</tr>
</tbody>
</table>

Table 2: Displacement of center of pressure in the interactions between conditions. The values are expressed in mean ± standard deviation. * • • Represent differences between groups and same letters represent differences between conditions.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group X Support</th>
<th>Vision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Youngsters</td>
<td>Middle-aged</td>
<td>Elderly</td>
</tr>
<tr>
<td>TD (cm)</td>
<td>16.0±6.1a</td>
<td>17.1±6.2A</td>
</tr>
<tr>
<td>APD (cm)</td>
<td>2.6±1.8a</td>
<td>1.7±1.8a</td>
</tr>
<tr>
<td>MLD (cm)</td>
<td>2.4±2.3</td>
<td>1.1±0.f</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group X Vision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Youngsters</td>
</tr>
<tr>
<td>TD (cm)</td>
</tr>
<tr>
<td>APD (cm)</td>
</tr>
<tr>
<td>MLD (cm)</td>
</tr>
</tbody>
</table>
EFFECTS OF THE STRAIN-COUNTERSTRAIN TECHNIQUE ON THE ELECTROMYOGRAPHIC ACTIVITY OF MASTIGATORY MUSCLES IN WOMEN WITH TEMPOROMANDIBULAR DISORDER

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INTRODUCTION
Among the signs and symptoms of temporomandibular disorder (TMD) knows that the hyperactivity of the masticatory muscles and orofacial pain are often present in these patients1, 2.

Another common change in masticatory muscles of these patients is the presence of myofascial trigger-points (MTP), with can cause both local and referred pain in the face and head3.

The manual therapy has been used increasingly in the treatment of TMD, becoming a effective conservative treatment, feasible and cost-effective4. Among the manual therapy techniques, a form often used in the treatment of MTP in the Strain-Counterstrain Technique (SCT), but few studies evaluate its effects on electromyographic (EMG) signal, mainly in the masticatory muscles of patients with TMD.

The purpose of this study was evaluate the effects of SCT on the EMG signal of masticatory muscles of patients diagnose with TMD.

METHODS
The study was conducted at John Basmajian Electromyography Lab’s in Piracicaba Dental School/ State University of Campinas. The sample consisted of 8 women (27.25±1.75 years), diagnosed with TMD, through the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) performed by a calibrated examiner.

To collect the EMG signal, the ADS1200 (Lynx®) with 12 channels was used with a variable gain of 1 to 1600, sampling frequency of 2000 Hz for each channel, bandpass filter 20-1000 Hz and PCI A/D converter with 16-bits resolution, where the signal was digitized and then stored on computer.

The electrodes were placed on the right masseter (RM) and left (LM), right anterior temporal (RT) and left (LT) and suprahyoid (SH). The reference electrode was positioned in sternal notch and the EMG signal was collected during rest and isometric 5 seconds.

The signal processing and visualization was performed with software AqDAnalisis, to calculate the RMS (μV). Was performed comparing the values measured in the muscles before, immediately after the application of SCT and after the fourth and final session of the intervention.

All patients were treated with the SCT for MTG described by Ricard L. (2005) for 4 sessions for approximately 35 minutes during 4 weeks (1 time/week).

The evaluation, localization and treatment of MTP were performed at each intervention session, by an experienced examiner.

The Shapiro-Wilk test was applied for the statistical analysis, followed by the t test for paired data, considered the critical level of p<0.05. Analyses were performed in the BioStat 5.0.

RESULTS AND DISCUSSION
The RMS values showed no statistically significant difference when comparing before (B), immediately post (IP) and post-late (PL) treatment with SCT, as show in the figures 1 and 2.

The effects of SCT for MTP and its effects on the EMG activity, especially in symptomatic patients, are still little studied in the literature. There are studies in the literature involving manual techniques acting on hyperactive neck muscles in their RMS values during rest and increase during the isometric lifting of the jaw. This behavior was not found in this study.

This behavior can be explained by the low number of samples (n=8), requiring increasing the sample and include a control and/or placebo group.

CONCLUSION

The results obtained in this study concluded that was not possible observe significant changes in EMG activity during rest and isometric masticatory muscles of TMD patients.

REFERENCES

ACKNOWLEDGMENT

We would like to acknowledge CAPES for the financial support.
EFFECTS OF UPPER CERVICAL MANIPULATION ON TMD’S SEVERITY

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INTRODUCTION
Temporomandibular disorder (TMD), characterized by pain in the orofacial region, can be associated with pain and discomfort in the cervical muscles. Synergy occurs due to a neurologic interrelation between the temporomandibular joint (TMJ) and the cervical segment. The neurologic interrelation is a result of the trigeminal caudal nucleus, where convergences of afferences from cervical levels (C1, C2, and C3) and orofacial region (trigeminal nerve) occurs. For Alcântara et al. (2002), the nociceptive afferences which originate from the TMJ may cause hyperactivity of the upper cervical muscles and, consequently, reduce mobility of C1. In order to revert such situation, one may use manipulation of the upper cervical spine, for it aims in reestablishing joint range of motion and promoting muscular relaxation (Herzog, Scheele and Conway, 1999) by neurologic pathways.

The objective of this study was to evaluate the immediate effects of upper cervical manipulation on the TMD severity.

METHODS
Six women were selected, ages between 20 and 37 (25.8±6.8) years, with TMD diagnosed by the RDC/TMD, and received two manipulations to the upper cervical column.

For the manipulation procedure, the volunteers remained in supine position while the therapist passively performed slight cranial traction of the head with rotation of the head, and then applied a high velocity and low amplitude thrust for rotation to the right side, followed by the same procedure with rotation to the left side.

The effects of manipulation on TMDs severity were evaluated by Fonseca’s anamnestic index (FAI).

FAI is a questionnaire used to classify TMD according to their severity. It consists fo ten questions that are possible answers “yes”, “no” or “sometimes”, where the individual must choose only one answer for each question.

To score, the answers “yes” were converted into the value 10, “sometimes” in the value 5 and “no” to the value 0. The values were summed. If the sum does not exceed 15 points, the individual is considered without TMD, if it was between 20 and 40 points, mild TMD, between 45 and 65 points, moderate TMD and above 70, severe TMD (Fonseca et al, 1994).

For statistical analysis was realized by utilizing the Anova F statistical test.

RESULTS AND DISCUSSION
As shown in table 1, the upper cervical spinal manipulation decreased the severity of TMD, because when performed comparing the pre and post intervention there was a significant reduction (p= 0.025) values of FAI.

The decrease in the severity of TMD may be due to the reduction of pain in the TMJ and masticating muscles and increased ADM lowering the jaw, which are frequent in TMD patients and may influence the function of this joint.

The reduction of pain was probably reflecting the manipulation by the effect on the spinal trigeminal nucleus flow, where, according to Marfurt and Rajchert (1991), there is convergence of afferents from the levels C1, C2 and C3 and the trigeminal nerve. The analgesic effect of manipulation was evidenced by Vicenzino and Wright (1995), in studies of cervical manipulation.

The increased of ADM of the lowered jaw may also have contributed to decreased pain. It is expected relaxation of the jaw elevator muscles after manipulation, which may have occurred due to connections with the caudate nucleus of the trigeminal motor nucleus in brain stem. Muscle relaxation after spinal manipulation has been shown in studies of DeVocht, Pickar and Wilder (2005), in studies of lumbar manipulation.

CONCLUSION
It is concluded that manipulation of the upper cervical spine decreases the severity of TMD in women.

REFERENCES

Table 1: FAI’s values pré and post treatment.

<table>
<thead>
<tr>
<th></th>
<th>FAI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre treatment</td>
</tr>
<tr>
<td>Grupo</td>
<td>75±16.4</td>
</tr>
</tbody>
</table>

* indicates significant difference
INTRODUCTION
The trunk of control (TC) in subjects with spinal cord injury (SCI) is considered a prerequisite for achieving functional stabilization in the wheelchair and the upper limb movements performed in sitting position, especially for having an anticipatory action performed by the spiniae erector and abdominal muscles (Pigeon et al., 2000). Thus, the objective of this study was to analyze the effect of lumbar segmental stabilization training (LSS) in SEMG and trunk balance in paraplegic patients.

METHODS
Five subjects (31.2 ± 12.93 years) with SCI T6 to L1 in accordance with criteria of the American Association Spinal Injury (ASIA) completed the study. For the analysis of trunk balance, the subjects were positioned with legs crossed and upper body upright (Bada position) on the platform balance (Biomec 400-EMG System, Brazil) and asked to remain static. The record of the oscillation of the trunk was made in two positions (arms on his knees and crossed arms at chest height) for 30s and each position was analyzed three times with 1 minute rest between them. The recording of electromyographic signal (SEMG) of the lumbar multifidus (LM) and transverse abdominal (TrA) muscles was done with portable electromyography (PS600 – Biometrics, UK) in the dorsal and ventral positions, respectively.

The subjects underwent a protocol of LSS for four weeks, with 12 progressive levels of exercises performing isometric contractions of TrA and LM muscles in dorsal and ventral positions, respectively. Each session consisted of 12 repetitions, holding 10 s and 30 s of rest (Pereira et al., 2010).

RESULTS AND DISCUSSION
The Table 1 shows a significant difference in total displacement of the trunk, the two test positions (hands on knees, P = 0.014; and crossed arms, P = 0.022), when comparing pre and post-training LSS. However, when comparing the positions, no equilibrium condition showed a significant difference (P>0.05) in both the pre and post-training.

According to Table 2, comparing the RMS of SEMG signal, pre and post-training LSS, the Wilcoxon test showed significant difference (P = 0.043) for both ML and for TrA muscles.

EFFECTS OF LUMBAR SEGMENTAL STABILIZATION IN THE PARAPLEGICS TRUNK BALANCE

Table 2 – RMS comparison of the ML and TrA muscles pre and post-training LSS

<table>
<thead>
<tr>
<th>Muscles</th>
<th>Pre-training (mV)</th>
<th>Post-training (mV)</th>
<th>P Valor</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML</td>
<td>102.62 ± 66.87</td>
<td>123.38 ± 62.21</td>
<td>0.043</td>
</tr>
<tr>
<td>TrA</td>
<td>78.93 ± 57.21</td>
<td>136.36 ± 70.22</td>
<td>0.043</td>
</tr>
</tbody>
</table>

Note: Wilcoxon test

Our results show that the training of LSS (adapted) improved control of the trunk, through the strengthening of the TrA and ML muscles. The reduction of body sway (total displacement) notes efficacy of this treatment in subjects with SCI, confirming the study by Hodges and Richardson (1996) which reinforces the importance of these muscles in controlling agonist – antagonist and in the trunk stabilization.

Several studies have demonstrated that LSS exercises help in the treatment of back pain and dysfunction in the trunk balance (Hides et al., 1994). They emphasize that these muscles (TrA and LM) promote the stability of the spine and improve the control of segmental motion (Hodges et al., 1997).

In this study, all subjects showed increased EMG activity of TrA and LM muscles, suggesting that LSS training had a beneficial effect on these important muscles for trunk control, confirming the studies of Hodges et al. (1997), who observed that the TrA is the main muscle in the control anticipation of the trunk.

The absence of studies showing the use of these tools (LSS + SEMG) in paraplegics complicates our discussion, since almost all of the articles published on the weave back pain.

CONCLUSION
The study results showed that, despite the LSS employee training be short, he was effective in increasing activation of the TrA and LM muscles and improves the trunk control in paraplegic patients.

REFERENCES
5. Hodges PW, Richardson CA. Hides C. Feedforward contraction of transversus abdominis is not influenced by the direction of arm movement. Exp Brain Res 1997; 114:362-70.

AKNOWLEDGEMENTS
Financial support of CNPq (Universal Edict 2008).

Table 1 – Comparison of the mean oscillation of the trunk in two equilibrium conditions, pre and post-training LSS

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Pre-Training</th>
<th>Post-Training</th>
<th>P Valor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand on knees</td>
<td>26.59±7.35</td>
<td>19.45±3.85</td>
<td>0.014</td>
</tr>
<tr>
<td>Total Displac. (cm)</td>
<td>27.44±3.63</td>
<td>19.50±2.87</td>
<td>0.022</td>
</tr>
<tr>
<td>AP Amplitude (cm)</td>
<td>1.05±0.27</td>
<td>0.72±0.44</td>
<td>0.158</td>
</tr>
<tr>
<td>ML Amplitude (cm)</td>
<td>0.70±0.19</td>
<td>0.53±0.23</td>
<td>0.111</td>
</tr>
<tr>
<td>Crossed arms</td>
<td>27.44±3.63</td>
<td>19.50±2.87</td>
<td>0.022</td>
</tr>
<tr>
<td>AP Amplitude (cm)</td>
<td>0.98±0.43</td>
<td>0.64±0.23</td>
<td>0.144</td>
</tr>
<tr>
<td>ML Amplitude (cm)</td>
<td>0.70±0.25</td>
<td>0.59±0.08</td>
<td>0.450</td>
</tr>
</tbody>
</table>

Note: t Student test (paired)
INTRODUCTION

Isometric contraction depends on the agonist and antagonist activation level (Hammond et al., 1998). The aim of this study was to evaluate the biceps and triceps activation during isometric contraction of flexors elbow at different contraction intensities.

METHODS

Five women, mean age of 21.66 ± 3.11 years, without any musculoskeletal dysfunction in the upper limbs were evaluated. Electromyographic activity (EMG) was obtained by the electromyography equipment BIOEMG1000 (Lynx ® Sao Paulo, SP, Brazil). Active simple differential surface electrodes composed of two Ag bars (Lynx Electronics Ltda, São Paulo, SP, Brazil) were used. For noise reduction was used a rectangular stainless steel reference electrode (33x31 mm).

During EMG record, subjects remained seated in a chair with back supported, eyes open, feet on the ground and arms resting on the lower limbs. The electrodes were placed in the belly of the biceps and triceps muscles, with silver bars perpendicular to the muscle fibers. EMG signals were obtained for isometric contraction of elbow flexor muscles in 25%, 50% and 100% of maximum voluntary contraction, during 5 seconds.

The co-contraction of the triceps muscles was quantified by a formula described by Hammond et al. (1998), in which the antagonistic muscle (triceps) activity is divided by the sum of the antagonistic muscle activity and agonistic (biceps) as in the following formula:

\[
\text{Co-contraction} = \frac{\text{EMG}_{\text{agonist}}}{\text{EMG}_{\text{agonist}} + \text{EMG}_{\text{antagonist}}} \times 100
\]

RESULTS AND DISCUSSION

The analysis of the EMG signal showed an increased muscle activity with intensity of contraction increasing. Ebersole et al. evaluated electromyographic responses of the rectus femoris, medialis and lateral vastus and they observed differences between maximum voluntary contraction (MVC) percentage and the electromyographic signal amplitude. Koleine Managhani et al. observed EMG signals increased amplitude of elbow flexors associated with intensity of contraction increasing, which agrees with findings of this study. Also the triceps activity increased with intensity of contraction increasing. This finding may be explicated by Sjölander et al. that consider antagonist muscle contraction necessary to increase joint stability or to decrease activities complexity.

CONCLUSION

When the intensity of elbow flexors contraction increase, occurs increased biceps electromyographic activity and higher triceps co-contraction.

REFERENCES

ELECTROMYOGRAPHIC ANALYSIS OF HANDWRITING: STUDY OF TWO GRASP PATTERNS

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INTRODUCTION
Handwriting is the most complex language modality and a communication form predominantly present in our daily life, especially in academic situations. Handwriting performance is modified along the psychomotor development, advancing from immature grasp and manipulation of writing objects, characterized by prominent use of proximal upper limb structures to mature patterns, where the movement is mostly performed by distal structures and characterized by greater dexterity and coordination. Although apparently linear, the development of these motor patterns may not progress to advanced and mature stages, becoming common the permanence of immature or transitional grasp patterns in adult life, reflecting on complaints related to illegibility, reduced written production and even pain and muscular injuries.

The present study had by objective to analyze the electromyographic activity of proximal and distal muscles of the upper limb during a handwriting activity in two groups of young adults: one composed of individuals who used a mature grasp other composed by subjects who used a transitional grasp pattern.

METHODS
Twenty-four (24) right-handed university students, between 18 and 28 years, BMI<30kg/m², participated in this study; twelve (12) subjects who used the dynamic tripod, a mature grasp pattern and twelve subjects that used the static tripod, a transitional grasp pattern, as their natural handwriting grasps.

Subjects were positioned seated in a university desk, with clipboard fixed to the right and performed a handwriting task using a ballpoint pen with 8 mm hexagonal barrel and 1 mm thickness point, writing on a sheet of foolscap paper, with space between the lines of 13 mm.

The muscles trapezius, biceps braquii, extensor carpi radialis brevis (ECRB) and flexor digitorum superficialis (FSD) were analyzed. The sEMG activity was recorded through the Miotool 400 system, with 14-bit resolution A-D converter, data acquisition board of 2000 samples per second and common mode rejection of 100dB, with signals amplification of 1000 times and sensors with input impedance of 1010Ω. The signals passed through a bandpass filter between 10Hz and 500Hz and 60Hz notch.

Subjects were instructed to write the word ESTRELA, performing five repetitions with 30 second intervals between each activity. The electromyographic activity was obtained and normalized in RMS and the maximum voluntary contraction of the selected muscles was used as reference. Data were analyzed through the SPSS (version 15.0) statistical software. It was considered as significance level P <0.05.

RESULTS AND DISCUSSION
There was significant increase in myoelectric activity of the trapezius and biceps brachial among individuals who used the static tripod grasp. Statistical analysis through Mann-Whitney-Wilcoxon tests showed statistically significant relations (P <0.001) only for the activity of proximal muscles, represented by trapezius and biceps braquii. There were no observed statistically significant correlations (P> 0.05) when compared the electromyographic activity of FSD and ECRB muscles between subjects. The increased activity of the trapezius and biceps indicates greater use of movements such as elevation and scapular protraction and elbow flexion during writing. This pattern is seen as ineffective by using bulky muscles in repetitive activities, characterizing elevated energy consumption.

The association of an ineffective way of writing with the increased demand observed during the progression of academic life, leads to inappropriate compensatory patterns and potential damage to upper limb structures.

CONCLUSION
There was higher electromyographic activity and majority use of the upper limb proximal muscles among subjects using the static tripod grasp compared to those who adopted a mature grasp pattern. Individuals who used the dynamic tripod grasp as their natural handwriting grasp pattern showed low activity of proximal muscles, indicating a concentrated activity of distal and more precise muscles, providing objective data that may indicate the greater effectiveness of mature over transition grasp patterns.

Obtained data could based interventions with individuals who present problems related to handwriting. Since the studies in this area indicates a consensus among therapists and educators about the importance of dynamic tripod grasp as the most effective grasp pattern, strategies who support the development of this pattern are encouraged in front of the results obtained in this study.

REFERENCES

Table 1 – Mean EMG activity of the trapezium, biceps brachii, ECRL and FDS during handwriting with two different grasp patterns (values in % MVC).

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Dynamic Tripod Grasp %MVC (s.d.)</th>
<th>Static Tripod Grasp %MVC (s.d.)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trapeziun (upper fibers)</td>
<td>3.2 (0.2)</td>
<td>13.4 (2.6)</td>
<td>.000*</td>
</tr>
<tr>
<td>Biceps Braquii</td>
<td>1.1 (0.4)</td>
<td>3.6 (2.1)</td>
<td>.001*</td>
</tr>
<tr>
<td>ECRB</td>
<td>9.2 (6.2)</td>
<td>8.5 (1.1)</td>
<td>.729*</td>
</tr>
<tr>
<td>FDS</td>
<td>10.7 (1.5)</td>
<td>15.4 (4.0)</td>
<td>.225*</td>
</tr>
</tbody>
</table>

Mean values and SD expressed as a percentage of MVC.
INTRODUCTION

One of the valuation tools of activity standard of the masticatory muscles is electromyography, what involves the detection and recording of electrical potentials in muscle fibres. In individuals with dentofacial deformity (DFD) the masticatory function may be damaged, because the change in occlusion can have an adverse effect. Major studies on masticatory function in individuals with dentofacial deformity (DFD) showed that these individuals present lower values of the electrical activity of masticatory muscles in relation to individuals with normal occlusion.

The objective of this study was to verify if there are differences in relation to masticatory function in regard to electromyographic activity of elevator muscles jaw in individuals with DFD, comparatively to individuals with normal occlusion.

METHODS

Participated 20 individuals, 10 with DFD (experimental group - EG) evaluated in prior phase to orthognathic surgery, and 10 individuals with dentofacial equilibrium that constituted the control group (CG), adjusted by gender and age with EG.

It was done the habitual mastication by electromyography of the masseter and temporals muscles, using the electromyograph EMG SYSTEM (São José dos Campos - SP Brazil).

The individuals did the habitual mastication of a piece of latex rubber 2cm length, during 60 seconds; it has being discarded the two first seconds, considering the time interval of 10 seconds subsequent. The results were recorded in microvolt Root Mean Squared (RMS). It was calculated the percentage of muscle activity multiplying the value of the masticatory function of the masseter and temporal muscles by one hundred and the result of this operation was divided by value of the maximum activity of the same muscle. It was also analyzed the measurement of the act duration and masticatory cycle in seconds.

The comparison among the results was realized by the way the statistical test “t” Student, adopting a significance level of 5%.

RESULTS AND DISCUSSION

In relation at amplitude percentage of muscle activity there was difference significant statistically (p <0.01) in comparison of the EG with CG values in all muscles tested, being with the EG showed lower average values than the CG, which corroborates the results of previous studies. How duration of the masticatory act there was significant difference in comparison EG with CG in temporal muscles (p <0.01, p <0.01), being that the EG was slower than the CG, which can be explained once that DFD interferes in functional conditions of individuals, causing more slowly in masticatory.

In individuals with DFD, the muscle activity and masticatory muscles coordination are prejudiced parameters, it has being taking way an increase in the mean values in relation to the CG. As so described by some authors there was no statistical significance about the duration of the cycle when compared the groups.

CONCLUSION

The group of individuals with dentofacial deformity showed lower values in relation to muscle activity as well as shorter duration of the masticatory act, which proves the fact of dentofacial deformity interfere with electromyographic activity during chewing.

REFERENCES


Table 1. Electromyography of the values of right and left masseter and temporal muscles of the EG and CG subjects, the duration of the act and cycle and percentage of muscle activity.

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Act duration (m/s)</th>
<th>Cycle duration (m/s)</th>
<th>Muscle activity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RIGHT MASSETER</strong></td>
<td>EG</td>
<td>CG</td>
<td>EG</td>
</tr>
<tr>
<td>Average (dp)</td>
<td>p</td>
<td>Average (dp)</td>
<td>Average (dp)</td>
</tr>
<tr>
<td>3.29 (1.3)</td>
<td>0.43</td>
<td>4.23 (1.82)</td>
<td>3.70 (0.35)</td>
</tr>
<tr>
<td>8.95 (5.96)</td>
<td>0.85</td>
<td>9.78 (1.08)</td>
<td>8.41 (2.72)</td>
</tr>
<tr>
<td>97.25 (0.39)</td>
<td>0.00*</td>
<td>112.11 (0.25)</td>
<td>147.60 (1.05)</td>
</tr>
</tbody>
</table>

*p<0.05 – Statistically significant
ELECTROMYOGRAPHIC ACTIVITY OF THE ANTERIOR TEMPORALIS, MASSETER AND STERNOCLEIDOMASTOID MUSCLE IN INDIVIDUALS WITH DENTOFACIAL DEFORMITIES

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INTRODUCTION

Dentofacial deformity is characterized by a change in dental occlusion associated with an alteration of the facial skeleton, with important consequences for stomatognathic system function1. According to Angle, malocclusions can be divided into skeletal classes I, II and III. They refer to the relative position of the mandible and the maxilla on the sagittal plane, with predetermined cephalometric points being used as reference2.

The relation between craniofacial morphology and the activity of masticatory muscles has been widely studied. According to some authors, patients with dentofacial deformity class II and III may present changes in the electromyographic activity of masseter and anterior temporalis when compared to class I.

Several studies point the close relationship between the masticatory system and the neck region, and report the co-activation of sternocleidomastoid (SCM) during clenching and chewing3. Thus, individuals with dentofacial deformity may develop changes in the electromyographic activity of the SCM3,4.

On this basis, the objective of the present study was to determine whether dentofacial deformities influence the electromyographic activity of these muscles during right and left chewing.

METHODS

The present study was approved by the Research Ethics Committee of the University Hospital, Faculty of Medicine of Ribeirão Preto, University of São Paulo (Protocol HCRP n° 2513/2007). Thirty patients of the Craniomaxillofacial Surgery Outpatient Clinic, Integrated Center of Study of Facial Deformities, HCFMRP-USP, participated in the study as the group with dentofacial deformities. Fifteen patients with a diagnosis of class II dentofacial deformity were assigned to deformity group (DG-II) and 15 patients with a diagnosis of class III dentofacial deformity were assigned to DG-III. Fifteen volunteers with no changes in facial morphology or in dental occlusion were assigned to the control group (CG).

All subjects were submitted to bilateral electromyographic evaluation of the anterior temporalis, masseter and SCM muscle during right and left chewing (Trident) with a Myosystem-Br1 eight-channel computerized electromyograph. Six channels of the system were used for the electromyographic recording. After the volunteer was positioned in the electromyographic recording was fired for a period of 5 seconds. The Myosystem I program, version 3.5 was used for signal visualization and processing.

After all the recordings were obtained, the ensemble average values were calculated in μV for each muscle individually in the two situations. The ensemble average values achieved during maximum clenching were used to normalize the data by the statistical program SPSS 17.0. The nonparametric Kruskal-Wallis test was used to analyze statistically the differences between groups.

RESULTS AND DISCUSSION

There was no difference between groups (p>0.05). In the left anterior temporalis muscle during right chewing, there was a tendency to greater electromyographic activity in patients with dentofacial deformity when compared with the control group (p = 0.054).

These results don’t agree with the study of Moreno et al. (2008)5, because significant differences were observed between Class I, II and III individuals during the electromyographic activity of anterior temporalis and masseter. No literature studies have observed the activity of SCM muscle in patients with dentofacial deformity during chewing, just in the clinical condition of maximal voluntary clenching and rest position4.

CONCLUSION

We may state that dentofacial deformity (class II and III) did not influence the electromyographic activity of the anterior temporalis, masseter and SCM in the situation of right and left chewing.

REFERENCES


ACKNOWLEDGMENTS

To CAPES (Coordination of Improvement of Higher Education Personnel) for the financial support.
INTRODUCTION

Cryotherapy is a therapeutic modality that can reduce the temperature of tissues, and therefore, affects the muscular contraction performance. However, despite the wide use of cryotherapy in clinical practice, the study results do not allow definite conclusions about its effects on neuromuscular control. Therefore, the aim of this study was to analyze the effect of cryotherapy on the electromyographic activity of the biceps brachii muscle at 25%, 50%, 75% and 100% of maximum voluntary isometric contraction (MVIC) of forearm flexion.

METHODS

Forty healthy women were selected and divided into cryotherapy group (CRG) with 20 women (BMI: 21.56kg/m²±1.70, mean age: 22.4 ±2.28) and 20 in the control group (CG) (BMI: 22.07kg/m²±1.91, mean age: 24 ±3.83). On the first day of collection, the volunteers were submitted to a MVIC test of the forearm (test of the forearm flexors muscle) non-dominant upper limb). Data obtained by load cell simultaneously to the electromyographic signal (SEMG) were recorded. MVIC was maintained for 4 seconds, with a 60 second interval between them, and this was carried out six times. Before (pre) and after (post) applying or not cryotherapy, isometric contractions of forearm flexion at 25%, 50%, 75% and 100% of MVIC were performed by the volunteers, and data obtained by load cell simultaneously to the SEMG were recorded again. This second day of data collection occurred with a 48 minimum interval after the collection of MVIC.

Values (Kgf) corresponding to the percentages of submaximal contractions were calculated based the MVIC collected on the reference electrode on the acromion. Cryotherapy was applied using a 1.5 liter of ice water (8° C) for 6 hours. Meigal et al. (1998) also showed an increase of RMS in cold air conditions (10° C) for 30 minutes and cold air (10° C) plus an intake of one liter of ice water (8° C) for 15-20 minutes. The conclusion was that there is a decrease in muscle performance during activities of the upper limbs in cold environments. Such hypothesis is supported by this study, as an increase in RMS and a decrease in MF suggest a higher muscle recruitment rate to maintain the same levels of strength, which results in a reduced muscle performance.

CONCLUSION

In this study, a significant decrease was observed in skin temperature of the biceps brachii muscle after the application of CR (preT = 31.6 ± 11.4° C; postT = 11.3 ± 05.3° C), while in CG there was no change in temperature. No changes were verified in RMS and MF in CG.

In CRG, there was a significant increase in RMS and significant decrease in RMS BB at all contraction levels. The results obtained by Coulange et al. (2006) corroborate our findings, since they also observed reduced MF after total body immersion in cold water for 6 hours. Meigal et al. (1998) also showed an increase of RMS in cold air conditions (10° C) for 30 minutes and cold air (10° C) plus an intake of one liter of ice water (8° C) for 15-20 minutes. The conclusion was that there is a decrease in muscle performance during activities of the upper limbs in cold environments. Such hypothesis is supported by this study, as an increase in RMS and a decrease in MF suggest a higher muscle recruitment rate to maintain the same levels of strength, which results in a reduced muscle performance.

REFERENCES

ELECTROMYOGRAPHIC ANALYSIS IN BODYBUILDING PRACTITIONERS AND NON-PRACTITIONERS SUBMITTED TO MUSCLE FATIGUE PROTOCOL

Oliveira GWS2

ACKNOWLEDGMENTS

To UNIFAL, by the support.
To the academics from the Physiotherapy Course for the participation on the study.

REFERENCES


RESULTS AND DISCUSSION

The research consists of nine individuals separated in four members for the bodybuilding practitioners group (G1) and five sedentary ones (G2). The G1 individuals’ averages 22.75±0.47 years old, 69.35±1.47 kg weight, 1.70±0.01 m tall. In G2 group, the found averages are: 22.00±0.31 years old; 69.10±1.92 kg weight and 1.72±0.02m tall. The IMC values averages 23.92±0.63 kg/m² in G1 and 22.83±1.08 kg/m² in G2. The IMC values of all participants are among 18.5 to 24.9 kg/m², classified as normal index according to OMS.

After the fatigue protocol, it notes the reduction of median frequency value in both groups, being more severe in G1 than in G2 one. Data are shown in Figure 1.

Comparing fatigue between the groups, G1 shows an increased state of muscle fatigue after the protocol than non-practitioners group. Such result seems to be contradictory, as bodybuilding practitioners, in thesis, would get higher anaerobic conditioning, so they would resist fatigue better. But, the composition of muscle fiber type, I or II, is essential when we discuss about fatigue. The muscle fibers type I (or red) have an increased blood supply, by this way they take longer to get state of fatigue. The muscle fibers type II (or white) have quicker contraction, since they don’t need so much oxygen, so they get quick fatigue.

The exercised carried out by the bodybuilding practitioners who wish hypertrophy are powerful and fast, which develops more fibers type II, deconditioning there individuals getting fatigued faster when compared to non-practitioners, who continue with more fibers type I.
ELECTROMYOGRAPHIC ANALYSIS OF FATIGUE OF THE BICEPS BRACHII

INTRODUCTION

The biceps brachii muscle is the predominant composition of type II fibers, and is fundamental in the action of numerous activities. Therefore, the need to establish protocols for muscle fatigue by surface electromyography for the area of rehabilitation, sports training or work activities, this study aims to analyze the behavior of electromyographic parameters of Root Mean Square (RMS) and Median Frequency (MF) over time in order to quantify the change in these parameters due to the installation of the biceps brachii muscle fatigue.

METHODS

We evaluated 19 adults who were sedentary, and handed both genders, aged between 18 and 30 years. Exclusion criteria: history of musculoskeletal dysfunction in the joints of the right arm (MSD). Subjects were tested for isometric contraction of the biceps brachii, with loads percentage of 25% and 75% of its maximum capacity for two different days, with a minimum interval of 48 hours. The duration of the test installation to fatigue, the RMS values and MF were analysis parameters. Regarding the RMS and MF, were selected ranges of values for the first 15 seconds of contraction and the last 15 seconds, by calculating the change (positive or negative) of the final values by subtracting the initial values. The values of RMS and MF were collected both in the test maximum voluntary contraction (MVC), as in the two protocols carried out at 25% MVC and 75% MVC. The RMS values obtained in the two protocols to induce fatigue were normalized by the mean value obtained with the MVC. This test consisted of three MVCs held for 10 seconds to three minutes. Considering all the variables presented data with non-normal distribution, we chose to treatment the nonparametric multiple comparisons. The groups were compared by the Wilcoxon test, with significance level of 5%.

RESULTS AND DISCUSSION

There was an increase of the RMS for the biceps, the two protocols. This increase in muscle recruitment was more evident during exercise at 75% of the maximum load. The change in MF was negative and also more evident during exercise at 75%. However, the time to installation of biceps fatigue protocol was higher than 25%.

CONCLUSION

The biceps fatigue showed greater than 75% of maximum load. Moreover, the same time had lower tolerance, with fatigued faster.

REFERENCES


Table – Electromyographic activity (mean ± standard deviation of RMS, FM and Time)
Biceps Brachii muscle (n = 19).

<table>
<thead>
<tr>
<th>Variables</th>
<th>25%</th>
<th>75%</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMS (±%Tf-T0)</td>
<td>10.17 ± 14*</td>
<td>55.05±35.8*</td>
</tr>
<tr>
<td>MF (Δfreq=Tf-T0)</td>
<td>-9.75 ± 6.4*</td>
<td>-21.97±10.9*</td>
</tr>
<tr>
<td>TIME (seg)</td>
<td>492.42 ± 151.9*</td>
<td>61.68 ± 23.4*</td>
</tr>
</tbody>
</table>

*p< 0.05 loads as compared to 25% and 75%
RMS: Root Mean Square
MF: Median Frequency
ELECTROMYOGRAPHIC ANALYSIS OF MASSETER AND TEMPORAL MUSCLES IN BRUXISM PATIENTS TREATED WITH ACUPUNCTURE

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INTRODUCTION

Many studies have already demonstrated that acupuncture has largely contributed in dentistry practice, or applied in a conventional way, that is, by manual stimulation of needles or used in modern techniques associated to electric stimulation devices or lasers. Its efficiency in the treatment of cranio-facial pains, such as idiopathic trigeminal neuralgias, maxillary sinusitis, temporomandibular joint arthrosis, herpes zoster, tooth pains and headaches has also been the target of many researches. The effectiveness of acupuncture was already proved for local and central analgesic, anti-inflammatory and anti-anxiety actions, and improvement of the immune defenses. Based on the preceding and because of the importance that facial muscles, particularly chewing ones, exert on various functions of human beings, this study aims to determine whether there is a decrease in the level of muscle activity and reversion of painful conditions in patients with bruxism after treatment with acupuncture techniques electromyographically evaluated.

METHODS

We selected 20 volunteers of both sexes, regardless of color, race and age between 18 and 25, divided into two groups, with and without bruxism, each containing 10 volunteers. The Masseter (superficial part) and Temporal (anterior part) were studied bilaterally and muscular action was taken at rest and during forced centric occlusion.

RESULTS AND DISCUSSION

The RMS (Root Mean Square) values obtained from electromyographic examinations were statistically compared using “t test” for comparison, before and after treatment with acupuncture. During rest, statistically significant differences among sessions of acupuncture (p <0.0001) were found. The same results were found during forced centric occlusion (p<0.0001).

CONCLUSION

The results indicated that acupuncture therapy was extremely effective in the treatment of bruxism, control of pain and decrease of electric activity of the chewing muscles.

REFERENCES

INTRODUCTION

The Cerebrovascular Accident (CVA) is defined by the World Health Organization (WHO) as a rapidly developing clinical sign of focal disturbance of cerebral function, with a presumed vascular origin and more than 24 hours. The paresis, spasticity, and loss of ability to fractionate the movements are the main complications of motor impairment people exposed to CVA. A suggested method of therapy for treating post-stroke is the training for the whole body vibration (TV) capable of inducing acute and chronic improvements in motor performance. During exposure to vibration there is an increased activity of alpha motoneurons of the affected muscles, reflex activation of the response induced by increased activity of sensory Ia endings this reflex activation is known as a vibration tonic reflex (RTV). The objective of this study is to assess the acute effects of vibration in patients (CVA).

METHODS

This is a clinical trial approved by the Ethics Research at the University of Vale do Sapucaí with protocol number 1499/10. The sample consisted of 43 individuals affected by CVA, mean age 59.48 ± 10.60 years. The subjects were divided into two control groups (CG – n: 10) and intervention (GI – n: 33). For the treatment was used a vibration platform (model Lion – triplane ®) with frequency 50 Hz and amplitude 2 mm, and to evaluate the pattern of muscle contraction apparatus electromyography (EMG model – 800 C). All subjects followed the same treatment protocol applied in one day. First, all patients underwent electromyography examination, the motor points of rectus femoris and tibialis anterior muscles bilaterally. Subsequently they underwent the application of vibrational therapy following this steps: 1. Semi-flexed standing posture (30 degrees) for 1 minute, 2. Semi-flexed standing posture (90 degrees) for 1 minute. 3. Leg support on hemiparetic member for 1 minute and 4. Semi-flexed standing posture (30 degrees) for 1 minute. There was a 1 minute rest between each step. And lastly they underwent electromyographic evaluation. The choice for analysis of the parameters of the electromyographic signal was carried out by the root Mean Square (RMS) being excluded the first and fifth minutes of analysis. The statistical analysis employed was the Mann-Whitney test for comparison between groups, test (ANOVA for repeated measures) to compare measurements between groups and times, and then multiple comparison test of Tukey for groups at all times.

RESULTS AND DISCUSSION

Of the forty-three subjects recruited to the study IM (n. 33) and GC (n.10). In GI, there was a sample loss of six individuals. The demographic data and RMS are shown in Table 1 and 2 below. Note that no statistical difference in comparison between groups, only the TA compared between times. The main finding of this study was that a session of whole body vibration did not influence the neuromotor recruitment. Tihanyi et al. analyzed the effect of whole body vibration in a session in stroke patients and found a significant increase in maximal voluntary strength after application of vibration (6 minutes at a time - one-minute rest between sets, a frequency 20 Hz and the amplitude of 5 mm). In comparison Jackson et al. analyzed the acute effect of whole body vibration in patients with multiple sclerosis (frequency of 2 Hz and 26 Hz, amplitude of 6 mm for a period of 30 seconds) and didn’t find in their results a significant increase in the production of isometric torque of quadriceps and hamstring between the condition of frequency of 2 and 26 Hz, but a tendency to elevate the medium after 30 seconds was better at 26 Hz. In this study was employed a frequency of 50 Hz and amplitude of 2 mm, analyzing the frequencies in the two previous studies it is observed less frequently, we can suppose that there was fatigue after the application of vibration. This was also observed in other studies.

CONCLUSION

The whole body vibration did not cause neuromotor recruitment in these population. I suggest other studies with a modified frequency to check for new results.

ACKNOWLEDGMENTS

We thank all the patients who contributed to this study and the Lion equipment.

REFERENCES


Table 1 – Demographics data

<table>
<thead>
<tr>
<th>Group</th>
<th>Age</th>
<th>Gender</th>
<th>LA</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>59.90±11.32</td>
<td>60%</td>
<td>40%</td>
<td>57.57%</td>
</tr>
<tr>
<td>C</td>
<td>58.1±8.14</td>
<td>80%</td>
<td>20%</td>
<td>70%</td>
</tr>
</tbody>
</table>

Table 2 – Data of the variables RMS.

<table>
<thead>
<tr>
<th>RMS</th>
<th>Comparison between Gi and GC</th>
<th>Comparison between Times (I e F)</th>
<th>Interaction between groups and times</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMS RFA</td>
<td>P=0.936</td>
<td>P=0.765</td>
<td>P=0.706</td>
</tr>
<tr>
<td>RMS TAA</td>
<td>P=0.111</td>
<td>P=0.074</td>
<td>P=0.190</td>
</tr>
<tr>
<td>RMS RF NA</td>
<td>P=0.506</td>
<td>P=0.896</td>
<td>P=0.453</td>
</tr>
<tr>
<td>RMS TA NA</td>
<td>P=0.240</td>
<td>P=0.004 *</td>
<td>P=0.705</td>
</tr>
</tbody>
</table>

* there was statistical difference
ELECTROMYOGRAPHIC ANALYSIS OF THE TRAPEZIUS – FIBER UPPER AND LONGUISSIMUS (LUMBAR PORTION) MUSCLE AFTER PLACEMENT BIMAXILLARY PROTHESIS

INTRODUCTION
The stomatognathic system (IS) plays an important role in postural control. A functional unit is characterized by several structures: skeletal components (maxilla and mandible), teeth, soft tissues (salivary glands, nervous and vascular Supplement), temporomandibular joint (TMJ) and masticatory muscles. These structures act in concert to carry out important functional tasks (talking, chewing and swallowing)1. One resources used to evaluate the pattern of muscle contraction is electromyography (EMG), it is a diagnostic device used to detect and record the electric potential2 electrical muscle fibers. The objective is to verify the electromyographic activity of the trapezius - upper fibers and longissimus- lumbar portion after placement bimaxillary prosthesis.

METHODS
This clinical trial was approved by the Research in Ethics committee protocol No. 065/2011. The study included 28 volunteers (18 women and 10 men) recruited from the Prosthodontics of Clinic of School the Dentistry the Alfenas of Federal University. The volunteers had a mean age of 62.50 ± 9.42 years, mean body weight 63 ± 11kg and height = 1.60 ± 0.09 m. We excluded patients with neoplasia, dentofacial deformity, lesion in the head and neck and individuals using muscle relaxant medication. To collect the electromyographic signals was used surface electromyography (EMG System Brazil ®) and active bipolar electrodes (mark HAL) and the reference electrode monopolar (mark Meditrace). We adopted all care for skin cleansing and shaving before fixing the electrodes3. The upper trapezius and longissimus (lumbar portion) were evaluated bilaterally and electrodes were positioned according to the protocol SENIAM3. The signals were collected at rest and maximum voluntary isometric contraction. The collections were performed first on the first day with the new prosthesis and one month after placing the same. All prostheses were fabricated by the same dentist. Data were collected electromyographic three times by the same examiner. For statistical analysis we used the mean of three measurements. The software used was PAST software version 1.74. For comparison of the data used the t test.

RESULTS AND DISCUSSION
One month after placement of the prosthesis was observed that there was no statistical difference for the upper fibers of trapezius and longissimus (lumbar portion) (Table 1 and 2).

REFERENCES

ACKNOWLEDGMENTS
At UNIFAL-MG, by supporting the development of research.
INTRODUCTION

The massage is the technique of applying strength or vibration under the body soft tissues, including muscles, connective tissues, tendons, ligaments and joints to stimulate circulation mobility, elasticity or some pain release. Being established practice composed by a set of maneuvers that plays from the touch function to stimulate physiological effects.

Cupping is a technique used to applied pressure to the skin surface, having as goal, to deplete the Qi and the Xue (blood) to the Energy Channel Mainly and Secondary. The cup is a dome that produces inner negative pression when applied on the skin surface, causing an external stimulus, caused by the cups, the organism would search to re-establish the homeostasis.

METHODS

Experimental study of clinical approved by the UNIFAL-MG Ethics Committee (protocol n 229/2011) accomplished on the massotherapy lab from the Physiotherapy Course from UNIFAL-MG, where there were included on the study. To UNIFAL, by the support.

RESULTS AND DISCUSSION

The number 1 table shows the medium values and deviation model pattern from the control groups and from the experimental group. It can be seen a meaningful statistics difference on the group that was treated with the cup technique. With this result we can presume that cup promotes a more marked hyperemia and a sensorial stimulus bigger than the conventional massage, because the negative pression exercised by it, causes an improvement on the subcutaneous blood flux and a bigger gamma of stimulus to the autonomous nervous system.

CONCLUSION

Through our study we can conclude that among the used techniques, the groups that were treated with cupping achieved the best results, being statistically proved.

REFERENCES


ACKNOWLEDGMENTS

To UNIFAL, by the support.

For the results analysis, there was used the Shapiro - Wild test to the data normalization and the Tukey Test to the comparison between groups. The used program was the “R” from Experimental Design.

Table 1. Demonstrate the values of the medium and pattern deviation from the control group and experimental group.

<table>
<thead>
<tr>
<th>Group</th>
<th>RMSR</th>
<th>RMSR APÓS</th>
<th>RMSC</th>
<th>RMSC APÓS</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC</td>
<td>7.65±1.84</td>
<td>7.35±0.16</td>
<td>207.00±62.45</td>
<td>208.36±62.91</td>
</tr>
<tr>
<td>GM</td>
<td>8.98±0.31</td>
<td>9.53±0.79</td>
<td>192.17±33.91</td>
<td>257.57±99.20</td>
</tr>
<tr>
<td>GV</td>
<td>7.69±0.27</td>
<td>8.31±2.06</td>
<td>460.25±32.18*</td>
<td>570.61±15.30*</td>
</tr>
<tr>
<td>GM+V</td>
<td>6.69±0.23</td>
<td>6.47±0.15</td>
<td>222.82±32.02</td>
<td>216.51±40.00</td>
</tr>
</tbody>
</table>

GC-control group, GM-massage group; GV- Cupping group ; GM+V + cupping - massage group; RMSR - root mean square at rest, after RMSR - root mean square at rest after application of the technique; RMSC - root mean square contraction, after RMSC - root mean square of contraction after application of the technique. * Differs from the GV RMSC to RMSC after the application of the technique (p = 0.01).
ELECTROMYOGRAPHIC ANALYSIS OF THE TRAPEZIUS UPPER MUSCLE AFTER THE APLICATION OF MOXIBUSTION THERAPY

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INTRODUCTION
Currently, stress and anxiety have contributed to the formation of muscle tension, especially in the neck, causing pain¹,². These points can be treated with methods of acupuncture, moxibustion and which is capable of causing relaxing effects and pain relief, warming points becoming normal circulation.³ The moxa is characterized by the use of a stick of Artemisia (Artemisia vulgaris) a plant grown in China, with healing properties. Its technique can stimulate the release of endogenous opioids and serotonin characterizing the mechanism of control of chronic and acute pain, as well as having significant properties, capable of removing obstructions, eliminating the cold and dampness, promoting electrical and enzymatic changes of the skin, and making normal the circulation of energy meridians.³

The objective of this study was to investigate the effect of moxibustion on the trapezius muscle - upper fibers.

METHODS
This study deals with a clinical trial where subjects were randomized by simple random way, composed of 8 individuals representing the control group (CG) and 5 individuals representing the experimental Group (EG). The sample only included students from the University of Alfenas, with 20 to 30 years old, of both genders. Was approved to the Ethics Committee of Federal University of Alfenas.

The materials used were as follows: moxa (Artemisia stick), surface electromyography (EMG ® system Brazil), adhesive electrodes (Medtecning), 70% alcohol and cotton. The points of application of moxaterapia were meridiano Triple heater (TA) TA10 and TA15. The signals were collected at rest (3 samples) and maximum voluntary isometric contraction (3 trials). The upper trapezius muscle was measured bilaterally and the electrodes were positioned according to the protocol SENIAM (2007).

The analyzes were performed in a single session followed this procedure: 1. Electromyographic analysis, 2. Application of moxibustion, 3. After 5 minutes of the application was made again electromyographic analysis. Statistical procedures were performed: Tukey test to normality of the sample. The program used was the “R” of the Experimental Design and Shapiro-Wilk test to check the compare the GC GE (rest and contraction).

RESULTS AND DISCUSSION
Table 1 shows the values of mean and standard deviation of the variables: age, BMI (body mass index) and RMS (root mean square) at rest and contraction before and after applying the CG and SG.

The technique of moxa stimulates the nerve fibers, by specific receptors in transmission of stimuli to the brain taken by thermal sensitivity: the corpuscles of Krause and Ruffini⁴. Due to thermal effects on these statistical receptors, promoted by moxa, observed in this study that was no difference between the comparison of the CG and SG muscle at rest (p = 0.01),one can suggest that there was little recruitment of motor units due to muscle relaxation this technique provides. Contraction, there is an opposite effect, no statistical difference (p = 0.14), suggesting greater recruitment of motor units, an increase in local blood flow resulting in a greater muscle contraction.

According⁵, the ‘law of all or nothing’ is in agreement with the statement that if any fiber is stimulated to its limit, a full contractile response is triggered. If the stimulus is less than the threshold, does not occur contractile response. For any given fiber, it contracts completely or does not shrink at all. The maximum muscle relaxation promotes maximum muscle contraction.

CONCLUSION
Through this study we conclude that moxibustion therapy promoted improved muscle relaxation and contraction after the application of the technique.

REFERENCES

ACKNOWLEDGMENTS
I thank the Federal University of Alfenas, my advisor and co-advisors.

Table 1: Demonstrates the values of mean and standard deviation of RMS variables, age, BMI.

<table>
<thead>
<tr>
<th>Variables</th>
<th>GC R</th>
<th>GC C</th>
<th>GE R</th>
<th>GE C</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMS A</td>
<td>8.30±8.34*</td>
<td>259.21±143.05</td>
<td>10.02±11.22*</td>
<td>275.10±146.18</td>
</tr>
<tr>
<td>RMS D</td>
<td>9.5±9.04*</td>
<td>326.71±252.69</td>
<td>8.4±8.13*</td>
<td>256.30±171.08</td>
</tr>
<tr>
<td>Idade</td>
<td>22.75±2.65</td>
<td>22.75±2.65</td>
<td>21.8±1.09</td>
<td>21.8±1.09</td>
</tr>
<tr>
<td>IMC</td>
<td>23.87±2.44</td>
<td>23.87±2.44</td>
<td>23.06±2.58</td>
<td>23.06±2.58</td>
</tr>
</tbody>
</table>

* P =0.01 compared to CG with GE R, R
Electromyographic Analysis of Trapezius Muscle Submitted the Application of Acupuncture

INTRODUCTION

Originated at least four thousand years in China Traditional Chinese Medicine (TCM) includes a complexity of popular practices, and with its own language, which symbolically portrays the laws of nature interrelated with the harmony between the parties. Based on the theory of Yin-Yang, which is divided into two principles, two fundamental forces, which interprets all phenomena in the opposite and complementary. The Yin-Yang forces are governed by a principle called the Tao (way) (Yamamura, 1993).

Studies with electromyography (EMG) surface are related to electrical activity of skeletal muscle with the acupuncture points (Tought, 2006), but the results obtained with this technique do not offer conclusions about its viability in the use of EMG the study of the physiological mechanisms of acupuncture. The surface EMG is a method used to investigate muscle function in several types of analyzes such as biomechanics in neuromuscular disorders, fatigue strength and musculoskeletal rehabilitation. Thus, to provide a global representation of muscle activity in a noninvasive manner (De Luca, 1993), surface EMG can also be used to analyze whether acupuncture interferes with the activity of the muscle. Thus, the objective of this study was to analyze the electromyographic activity of the descending part of trapezius (TD), submitted to systemic application of acupuncture points in IG4, IG11, E36, F3, at rest and during maximal voluntary isometric contraction (MVIC) before and immediately after application of acupuncture.

METHODS

The sample included 26 volunteers (10 males and 16 females) were asymptomatic (obtained through a questionnaire) aged between 18 and 30 years, divided into three groups: G1MS the acupuncture points and IG4 composed IG11 8 volunteers G2MI acupuncture points E36, F3 and consisted of 8 volunteers G3MSI the acupuncture points IG4, IG11, E36, F3 with 10 volunteers. This study was approved by the Ethics and Research (CER), School Athens Protocol 004/2011.

Data collection was performed using a single differential surface electrode with a gain of 20 times and recorded by an electromyograph. The raw electromyographic signal was quantified by the Root Mean Square (Root Mean Square - RMS). The signals were subjected to a high-pass filter of 20 Hz and low-pass and 500 Hz sampling frequency used was 2000 Hz per channel.

The electrode surface of the descending part of trapezius muscle was fixed following the recommendations of SENIAM - Surface Electromyography for the Non-Invasive Assessment of Muscles, ie, was placed on the skin that lies at the midpoint between the acromion of the scapula and the spinous process the seventh cervical vertebra. The reference electrode was fixed to the skin over the manubrium of the sternum. The collection time of EMG activity was 05 seconds for the rest position and MVIC using the settling time of 2 minutes between coletas. a MVIC was performed in an armchair with parallel bars attached by chains to the adaptable length of the upper extremity of volunteers. The data were analyzed using nonparametric statistics, using Wilcoxon.

RESULTS AND DISCUSSION

Comparing the RMS values of the descending part of the trapezius muscle was observed significant reductions (p <0.05) both at rest for the descending part of the right trapezius (TD) of G1MS and the descending part of the left trapezius (TE) G2MI the MVIC for the descending part of the right trapezius (TD) of G1MS. There were no significant differences (p> 0.05) among all variables.

CONCLUSION

According to the methodology and analysis of the results of this study, it is concluded that acupuncture is capable of causing systemic changes electromyographic activity of the descending part of trapezius muscle, to reduce muscle activity.

REFERENCES

ELECTROMYOGRAPHIC ASSESSMENT OF POSITIONAL RELEASE THERAPY IN TRAPEZIUS MYOFASCIAL PAIN SYNDROME

INTRODUCTION

The International Association for the Study of Pain (IASP) defines Myofascial Pain Syndrome (MPS) as a regional pain syndrome accompanied by myofascial trigger points (MTrPs) that can affect any skeletal muscle (BALBINO; VIEIRA, 2005). The TrPs are nodules in palpable taut bands, usually within a muscle which is painful on compression and can give rise to characteristic pattern referred pain recognized by the patient (MENSE; SIMONS; RUSSEL, 2008). The Positional Release Therapy (PRT), that aims to reduce muscle spasm by placing the affected muscle in a position of comfort (CHAITOW, 2007), can also be used for the treatment of TrPs. In the present study, the objective was to evaluate the electromyographic signal before and after Ischemic Compression (IC) therapy associated with PRT in upper MPS.

METHODS

This is a quantitative research type, with a descriptive approach and transversal exploratory, been previously approved by the ethics committee of the State University of Paraíba – UEPB. The participants were a total of 15 volunteers with a diagnosis of MTrPs latent. For the diagnosis of MTrPs was established the need for these signs: painful nodule palpable, presence of referred pain, pain recognized by patient, presence of signal jump and taut band. For the electromyographic analyses was used the electromyography system (EMG) Miotool 400® surface, disposable electrodes Ag/AgCl MEDITRACE™. The parameters of electrode placement followed the proposed rules Surface ElectroMyoGraphy for the Non-Invasive Assessment of Muscles (SENIAM, 2012). The upper trapezius muscle was evaluated by the maximum voluntary isometric contraction before and after application of the PRT technique associated with IC. The results were analyzed in a descriptive and inferential manner by the SPSS® 13.0 using Kolmogorov-Smirnov Normality Test and Student’s t-test for paired data, adopting a level of significance of 5% for acceptance of the null hypothesis.

RESULTS AND DISCUSSION

The sample average age was 21.73 ± 3.19 years, average height of 1.64 ± 0.069 average weight 64.46±9.99 Kg. In the analysis in time domain values of RMS and normalized RMS performed by Kolmogorov-Smirnov test were parametrics. Both RMS values showed a significant statistically increase (p<0.05), as shown in Table 1. In the analysis of EMG signal parameter in the frequency domain, the data were parametric data by the Kolmogorov-Smirnov test, although it has not presented significant statistical increasing, as shown in Table 2. The results of this study corroborate with previous research concerning the reduction of the myoelectric responses to inhibition of MTrPs.

| Table 1 - Electromyographic signal in time domain. |
|----------|----------|----------|----------|
| Statistic | Before   | After    | Before   | After    |
| Average (X) | 69.66 | 101.26 | 15.68 | 16.34 |
| Standard Deviation (SD) | 40.74 | 49.95 | 2.12 | 2.43 |
| p | 0.017 | 0.16 |

| Table 2 - Electromyographic signal in frequency domain. |
|----------|----------|----------|
| FM (Hz) | Average (X) | Standard Deviation (SD) | p |
| Before | 75.53 | 9.02 |
| After | 71.22 | 17.49 | 0.13 |

CONCLUSION

In this study, the inhibition of MTrPs altered the parameters of the SEMG in domain over time and frequency. The small number of the sample (n=15) is an important point to be considered, it maybe have limited the results’ significance.

It is necessary to do out further research using surface EMG with larger samples, analyzing the same parameters of EMG in assessing the effectiveness of these techniques combined and isolated, using a group control.

REFERENCES

ELECTROMYOGRAPHIC BEHAVIOR OF NECK AND SHOULDER MUSCLES DURING THE KART RACING

INTRODUCTION

Amateur and professionals riders are subjected to vibrations from the race cars that result mainly in musculoskeletal disorders, especially in the neck and upper limbs (Mansfield; Marshall, 2001). Even in kart racing, where speed is achieved minor, the need to strengthen the muscles of the neck is something very special and the use of surface electromyography (SEMG) can also answer questions about these obscure muscles. Therefore, the aim of this study was to analyze the SEMG signal of the neck and shoulder riders during the race kart.

METHODS

Participants were 21 subjects, men, active and healthy (26.95 ± 7.83 years) kart riders (amateur) at least 6 months, who had no neck pain or a history of orthopedic and/or neurological diseases affecting the cervical spine and upper limbs.

To record the SEMG signal of the trapezius descendens (TD), anterior scalene (AS), sternocleidomastoid (SCM) and anterior deltoid (AD), on both sides of the body, was used an electromyography 8-channel (W4X8 model, Biometrics Ltd., UK) with active electrodes, simple differential. Previously to placement of the electrodes was done shaving, skin abrasion and cleaning with 70% alcohol to reduce the tissue impedance. The measures to place the electrodes were made with pilots sitting in chairs with back, cervical spine in neutral position and upper limbs hanging beside the body.

To capture the SEMG signal of TD, AS, SCM and AD, the electrodes were attached with double-sided tape and hypoallergenic tape at predetermined points of each muscle (Figure 1), according to Hermes et al. (2000). Was used the Student t test (independent) in the comparisons of the SEMG signal (normalized to peak) between muscles (TD, AS, SCM and AD) on opposite sides, Student t test (paired) in the comparisons in the same muscles with and without cervical protector, and ANOVA (One-Way) followed by Tukey post-hoc in the comparisons between muscles in the same side by means of SPSS (15.0), considering a significance level of 5%.

RESULTS AND DISCUSSION

As showed in Table 1, comparison of normalized values for EMG, between the right and left sides, only the muscle AD, showed a significant difference (P<0.01), with and without the use of the cervical protector. With respect to the neck muscles (TD, AS and SCM), was not noticed a significant difference (P>0.05) between the sides. Comparing the normalized values of the SEMG signal, with and without the use of the cervical protector, there was no significant difference. However, when comparing the same side of muscles, with and without the use of cervical protector (Table 2), ANOVA (One-Way) test showed a highly significant difference (P<0.01), just to the left side. The Tukey post-hoc test showed that the AD had higher percentages of the RMS with respect to the other muscles (TD, AS and SCM).

Our results show that the higher SEMG activity in the DA on the left, is probably due to the fact that most of the circuit is curved to the right, thus confirm its role in flexion of the shoulder (Rodrigues et al., 2007). The lowest values of the SEMG signal TD, AS and SCM, compared to DA, may suggest a primary action of stabilizing the cervical spine at the expense of handling, against the Blouin et al. (2007) study, who claim to be the superficial muscles (TD, AS and SCM) in the primary movement or an insufficient effect of G force, promoted by low speed reached by the karts (≈70 km/h) in the circuit (Minoyama; Tsuchida, 2004). The fact that the cervical protector did not decrease the amplitude of the EMG signal, can be explained by two reasons: 1) The type of protector used (made of foam) may not be stabilized the head; and 2) Have made only one lap on the circuit, with a protector, which certainly did not cause fatigue in the neck muscles.

CONCLUSION

The results have shown that for the circuit and test conditions used, AD left muscles generated greater electromyography activity and use the cervical protector did not influence the amplitude of the SEMG signal.

REFERENCES


Table 1 – Comparison of the SEMG signal normalized by the peak (%), between the right and left sides

<table>
<thead>
<tr>
<th>Muscles</th>
<th>Right Side</th>
<th>Left Side</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TD</td>
<td>0.13±0.06</td>
<td>0.14±0.05</td>
<td>0.553</td>
</tr>
<tr>
<td>SA</td>
<td>0.14±0.06</td>
<td>0.14±0.05</td>
<td>0.929</td>
</tr>
<tr>
<td>ECM</td>
<td>0.10±0.05</td>
<td>0.11±0.04</td>
<td>0.510</td>
</tr>
<tr>
<td>AD</td>
<td>0.13±0.05</td>
<td>0.27±0.09</td>
<td>0.0001</td>
</tr>
<tr>
<td>TD</td>
<td>0.15±0.07</td>
<td>0.14±0.06</td>
<td>0.787</td>
</tr>
</tbody>
</table>

Table 2 – Comparison of the SEMG signal normalized by the peak (%), with and without cervical protector in right and left sides

<table>
<thead>
<tr>
<th>Muscles</th>
<th>Right Side</th>
<th>Left Side</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS x EA</td>
<td>P=0.95</td>
<td>P=0.23</td>
</tr>
<tr>
<td>TS x ECM</td>
<td>P=0.42</td>
<td>P=0.08</td>
</tr>
<tr>
<td>TS x AD</td>
<td>P=1.00</td>
<td>P=0.79</td>
</tr>
<tr>
<td>EA x ECM</td>
<td>P=0.16</td>
<td>P=0.95</td>
</tr>
<tr>
<td>EA x AD</td>
<td>P=0.97</td>
<td>P=0.76</td>
</tr>
<tr>
<td>AD x ECM</td>
<td>P=0.36</td>
<td>P=0.43</td>
</tr>
</tbody>
</table>

Figure 1. Placement of the electrodes to record the SEMG signal
ELECTROMYOGRAPHIC BIOFEEDBACK APPLICATION IN AN OBSTETRIC PARALYSIS: A CASE REPORT

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INTRODUCTION

Surface electromyography is a tool to quantify the muscle electrical activity when it is subjected to a voluntary contraction through its fibers, which receive by the nerve an electrical conduction previously produced. The muscle fibers undergo a depolarization by action potentials, starting a ion movement and thus an electrochemical gradient around the fiber is formed. Such a change of polarity is the electromyographic signal who is captured by the EMG electrodes. Biofeedback is characterized as a therapeutic procedure performed by electronic instruments, applied through beeps and/or visual signs as an immediate response to actions from the patient, such as voluntary muscle contraction and relaxation of the same.1,2

The Obstetric Brachial Palsy (OBP) is defined as a partial or complete flaccid paralysis affecting the upper limb, injuring the brachial plexus during birth. The OBP can be classified according to the time of injury and type of injury involved the brachial plexus. The high injury or Erb-Duchenne affects the roots of C5-C6, and low or Klumpke that attacks the roots of C7-T1. In rare cases there is a third, which affects the roots of C5 to T1, more severe in relation to other. Since it affects the entire complex, the patient will feature the complete flaccidity of the affected limb, with the worst prognosis for the patient. The aim of this study was to report the application of electromyographic biofeedback as a tool in treating a patient with severe Obstetric Brachial Palsy (C5 to T1), to strength gain, in the preoperative of tendon transfer of the lateral head of the triceps to biceps brachialis.

METHODS

RPS patient, male, 11 years, coming form Guariba, born of normal birth, suffering serious injury to the brachial plexus at the left upper limb, of the type of root avulsion C5 to T1. Due to the severity of the injury, the patient had a deficit of the motor-sensory system and a significant functional deficits of the upper limb (LUL). In the evaluation was only observed active movement of the elbow extension, classified as grade 1 of function of the triceps muscle. He also had a semi-reducible deformity in ulnar deviation and wrist flexion, finger flexion and medial rotation of humerus. The patient had undergone a previous surgical exploration of the brachial plexus at birth, then a neurotization of the median and ulnar nerves into right C7 root and a blazing zetaplasty at the LUL. Since birth the patient has been doing physical therapy in your city. On the 07.26.2011 a electrodiagnostic evaluation was conducted and the Kratus® device was used as a load cell. The patient was seated with the LUL in 90 degrees of shoulder abduction and elbow flexion, with the therapist holding the member. The algometer was positioned at the lateral wrist and near the ulnar styloid process. For training, we used the EMG of Miotec®, Miotool® 400, connected via USB cable to the HP pavilion dv6500 notebook®, with Windows Vista Premium®. Bipolar electrodes connected to disposable sensors SDS500, software USB 1.0 Biotrainer Miotec®.

The position of the evaluation was maintained for the training, and so placed the electrode in the muscle belly of the lateral head of the triceps, according to recommendations of the International Society of Electromyography and Kinesiology (Isk/SENIAM).3 The training was conducted through the isometric contraction with manual resistance for 20 seconds with rest periods of 3 minutes repeating 5 times. The patient underwent training for 8 weeks totaling 16 training sessions.

RESULTS AND DISCUSSION

The patient was evaluated in the first session and after 8 weeks of treatment. At baseline the patient was 0.270kgF in LUL and 6.330kgF in RUL. In eight weeks the patient showed a gain in strength up to 1.142kgF of the left triceps, and the contratralateral suffered slight swing to 5.640kgF. The difference to the LUL is a gain of 0.872kgF and for the RUL a decrease of 0.690kgF.

Biofeedback is a tool that uses the cortical representation through neuroplasticity, and physiological activities that regulate neurogenesis in the brain at all levels, including neural cell proliferation, differentiation, migration, survival, maturation and integration of new neurons in the brain circuit, so that the patient recovers the movement.4 It has been suggested that plastic responses in the brain, as an explanation for motor learning, creating a new cortical representation, coupled with increased activation of muscle fibers.

CONCLUSION

In this case study examined, that electromyographic biofeedback was considered effective as a complementary tool in preoperative training to gain muscle function of the triceps brachialis. However, due to lack of studies about the topic, more studies are needed in the area for better clarification and standardization of the therapy.

REFERENCES

INTRODUCTION

Physical activity helps to prevent and reduce disease risks that may arise from the sedentary lifestyle. Strength training (ST) helps to improve the quality of life of its practitioners with an increase in bone mass, lean mass and decreased body fat percentage. There is a range in weight training exercises to work with the brachial triceps muscle, but literature did not define which joint position (prone or neutral) has greater muscular action in exercising triceps at pulley. Therefore, this study aims to analyze the muscular action of brachial triceps in pronated and neutral joint position using electromyography to determining where there is a greater muscular action of the triceps muscle when the exercise is performed in the pulley.

METHODS

A sample of 18 male participants apparently healthy between 20-40 years old with minimum three months on ST, at least 3-5 times a week. An EMG SYSTEM biological data acquisition equipment of 16 channels and bipolar electrodes of 11mm diameter and 2mm sensing surface connected to the acquisition unit of biological data was used to analyze electromyographic of the triceps muscle. The device calibration varied from 200 to 500mV division and the speed of the beam was 200ms/division. The filters were fixed in an amplitude of 10Hz for low frequency and 10KHz for high frequency.

To perform the triceps exercise in the pulley it was used a Nakagym crossover device. As a procedure for the acquisition, the surface electrodes were placed in skin previously shaved and clean place with 70% alcohol to reduce impedance and eliminate any interference. The electrodes were placed on brachial triceps, following the protocol suggested by SENIAM (Surface Electromyography for the Non-Invasive Assessment of Muscles).

The exercise in prone position was done with the use of a pulley and a straight bar. For the exercise with the neutral position was used a pulley and a rope. Participants performed 3 sets of 10 repetitions of the exercise triceps in the pulley with the load to which individuals are accustomed in their training sessions. Between each series was a rest period of 5 minutes.

The exercise was performed with the subject standing with their arms along the body, with elbows at an angle of 45°; while they executed the extension and flexion of the elbow, shoulders are keeping without moving with the elbow next to the trunk and flexed knees. The signal was captured at each joint position. Each series was held in a joint position proposed by the research being performed 10 repetitions in a prone position and 10 repetitions in the neutral position. All tests were performed in the same period, under the same conditions, and the signals were normalized by determining the MVIC (maximum voluntary isometric contraction).

RESULTS AND DISCUSSION

The methodology of this study was based on another study that evaluated the different types of grip on the triceps exercise, where significant differences in relation to the muscular action of the triceps muscle were found. In the study that analyzed the motion of pulling the electromyographic signal of the triceps muscle presented no difference in muscle activation showing it can be carried out with or without specific tongs.

Differences were found in electromyographic patterns in the footsteps pronated and neutral. Even exercising triceps muscle specifically, the behavior of triceps muscle was different between the pronated and neutral joint position. When comparing the electromyographic signal of the brachial triceps, it was noticed that there was higher electromyographic activity in the neutral position compared to the articulated prone position. This difference may be related to the action of flexors and extensors of the wrist and fingers, the wrist kinesiological characteristics, besides of being hypothesized by authors that there would be no difference in the activation pattern of the brachial triceps. Another factor that must be considered is the adequacy of the load in relation to the individual, because even running exercise in the same apparatus and knowing conduct the proposed exercise, it was used two joint positions and the materials for the execution of the exercises were different of the standard used by individuals and may interfere in the test results.

The electromyographic response of the brachial triceps in prone position was 336.19μv corresponding to 158.50% and the electromyographic response of the brachial triceps in neutral position was 362.83μv relative to 198.00%.

CONCLUSION

This study shows by the test used that the joint position where the action of brachial triceps is higher is neutral position.

REFERENCES


ACKNOWLEDGMENTS

Special thanks to the research group on biomechanics of Estácio de Sá University of Vitória – ES (Brazil).
INTRODUCTION

The Temporo Mandibular Dysfunction (TMD) can present many signs and symptoms including the occlusal dysfunction. There are clinical procedures that may contribute to the diagnosis and treatment of TMD when related to imbalances of occlusal origin.\textsuperscript{1,2} There is controversy in the literature regarding the effectiveness of occlusal adjustment in the treatment of TMD, but there is not an agreement among authors on how the procedure should be realized\textsuperscript{5}

The objective of this study was to make a electromyographic evaluation of the relationship between occlusal anatomy and activity of masticatory muscles in cases of Temporo Mandibular Dysfunction trough Functional Occlusal Adjustment.

Description of case

Foi investigada a situação oclusal de 3 voluntárias, idades entre 26 e 48 anos com todos os dentes, classe I de Angle, oclusão estável, portadoras de DTM miogênica, de acordo com o Research Diagnostic Criteria (RDC).

METHODS

It was performed palpation of Masseter and Temporal muscles at the first time of contact, associated with the assessment of dental anatomy shown by Bausch articulating paper markings on the occlusal surface of teeth. Functional Occlusal Adjustment was performed (FOA) by reduction of the restorative material guided by this information. After each individual adjustment, each above procedures were repeated. For the electromyography equipment was used BIOEMG1000 (Lynx ® São Paulo, SP, Brazil). It was collected electromyographic activity of the Masseter (M) and Temporal (T) muscles of both sides at the beginning of the tooth contact position of maximum intercuspation. The collections were performed after occlusal intervention immediately after the adjustment. It was evaluated the threshold of pain perception by Visual Analog Scale (VAS).

RESULTS AND DISCUSSION

It is known the combination of muscular force with the loads produced by occlusion during the movements of mandible\textsuperscript{2,4} Periodontal receptors are responsible for the modulation of the masticatory movements\textsuperscript{1}. The knowledge of biomechanics identifies occlusal imbalances that direct the positioning of the jaw, causing extra work of the muscles directly or indirectly related to it\textsuperscript{2,4}

The technique of Functional Occlusal Adjustment is intended to promote balance and symmetry of masticatory muscle work\textsuperscript{3} After its use was no improvement in the reporting of pain in all cases.

CONCLUSION

• The data obtained by EMG coincided with the order of contraction of the muscles examined clinically by muscle palpation, guided by the distribution of occlusal forces origin.
• There was a change in the articular paper’s marks over the occlusal surfaces and changes in electromyographic activity of the muscles studied after Functional Occlusal Adjustment, confirming the relationship between muscles of mastication and occlusal contacts.
• The electromyographic report showed that the Functional Occlusal Adjustment, performed by palpation and study of the articular paper marks on the occlusal surfaces of teeth, based on knowledge of Anatomy and Biomechanics of the occlusion, suggests to be an important factor in the solution of muscular imbalances and discomforts that can cause pain in the head and neck.
• Randomized studies are required with larger populations.

REFERENCES

ELECTROMYOGRAPHIC EVALUATION OF MASTIGATORY MUSCLES IN PATIENTS WITH TEMPOROMANDIBULAR DISORDER TREATED WITH MANUAL THERAPY

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2 São Paulo State University – FFC/UNESP
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INTRODUCTION
Temporomandibular dysfunction is characterized by functional and pathological changes that affect the temporomandibular joint, masticatory muscles and, eventually, other parts of the stomatognathic system. Manual therapy techniques of manipulation, mobilization, and specific exercises aim to stimulate proprioception, produce elastic fibers adhered to stimulate synovial fluid and promote the reduction of pain. The study aimed to compare, using electromyography, the effect of two types of manual therapy, mobilization cervical and temporomandibular mobilization in individuals with temporomandibular dysfunction.

METHODS
30 subjects were divided randomly into three groups, one group treated with cervical mobilization, one with a mobilization of ATM and another control group. 10 sessions were realized. The electromyographic evaluations were performed before and after the first of the fifth and tenth treatment session to collect data at rest, isometric and isotonic masseter and temporal muscles. The data were normalized by maximum voluntary contraction isometric. In the data was performed KS normality test, ANOVA and Tukey post test.

RESULTS AND DISCUSSION
Was found in the cervical group there was a significant increase in the electrical activity of the masseter at rest, isometric and isotonic. In the ATM group, we found a significant increase in RMS of rest time, and increased normalized envelope of the two muscles in isotonic task.

CONCLUSION
Manual therapy increases the electromyographic activity of masticatory muscles, cervical mobilization had a greater effect in the masseter, and mobilization of ATM had no effect in the two muscles studied.

REFERENCES

ACKNOWLEDGMENTS
Thanks to the Dean of Research at UNESP-Marilia financial support, to Prof. Dr. Cristiane Pedroni for guidance in research, my parents, girlfriend and friends for critical support in my life.
ELECTROMYOGRAPHIC EVALUATION OF TRAPEZIUS MUSCLE IN PSYCHOLOGICAL STRESS PATIENTS SUBMITTED TO ACUPUNCTURE TREATMENT

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INTRODUCTION

This research was performed order to propose an alternative treatment for stress, considered a phenomenon of modern life, which may be present in the lives of all people, regardless age, sex, social class or occupation. The trapezius muscles, right and left, were evaluated electromyographically in these individuals, one week before the acupuncture therapy and after completion of treatment.

METHODS

For this study 10 volunteers were selected and submitted to a questionnaire that evaluated the signs of psychological stress. The trapezius muscle was studied by better reflect the signs of stress. This was studied bilaterally capturing the muscular action at rest and isometric activity, performing lifting and lowering of shoulders. In each of acupuncture session, was performed needling from C7; points obtained from a pentagram theory and points of confluence the distint meridian different affected in pentagram theory.

RESULTS AND DISCUSSION

We obtained the following electromyographic (RMS - root mean square): with the volunteer at rest in the pre-and post-acupuncture; lifting the shoulder in pre and after acupuncture the values of root mean square (RMS) (p <0.01) (Table 1 and 2). In this study we observed that the RMS values were lower after the acupuncture treatment, indicating a decrease in muscular activity and stress, according to recent studies1,2,3, as well as decreased psychological and physical symptoms caused by estresse4,5.

Table 1 - Analysis of variance values of root mean square signal (RMS) in trapezius muscle at rest before and after treatment of acupuncture evaluated electromyographically. **= P <0.01 (significant at 1% probability).

<table>
<thead>
<tr>
<th>Sources of variation</th>
<th>Before treatment</th>
<th>After treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Media</td>
<td>20.9590</td>
<td>6.9200</td>
</tr>
<tr>
<td>Standard Error</td>
<td>0.6422</td>
<td>0.7873</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.0307</td>
<td>2.4897</td>
</tr>
<tr>
<td>p-value</td>
<td>&lt; 0.0001**</td>
<td></td>
</tr>
</tbody>
</table>

Table 2 - Analysis of variance values of root mean square signal (RMS) in trapezius muscle at lifting shoulder before and after treatment with acupuncture evaluated electromyographically. **= P <0.01 (significant at 1% probability).

<table>
<thead>
<tr>
<th>Sources of variation</th>
<th>Before treatment</th>
<th>After treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Media</td>
<td>195.4580</td>
<td>87.1340</td>
</tr>
<tr>
<td>Standard Error</td>
<td>5.9014</td>
<td>10.6585</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>18.6619</td>
<td>33.7052</td>
</tr>
<tr>
<td>p-value</td>
<td>&lt; 0.0001**</td>
<td></td>
</tr>
</tbody>
</table>

CONCLUSION

The muscles showed less electromyography activity after treatment thus showing the effectiveness of acupuncture treatment in individuals with psychological stress.

REFERENCES

INTRODUCTION

The use of cryotherapy in rehabilitation of Athlete’s ankles has widespread. It is known that these individuals return to sports activities without complete healing of lesions and they use this feature to control pain and residual swelling. However, the influence of cryotherapy in motor control is controversial. Several studies have examined the adverse effects of cryotherapy on functional performance, with variables such as speed, agility, strength and sensormotor control. The objective of this study was to evaluate the effect of cryotherapy in the neuromuscular response of the dominant leg after ankle inversion movement.

METHODS

The sample consisted of 13 male athletes, all basketball players, age 23.54 (SD = 6.3) years, weight set at 96.46 (SD = 22.2) kg, height of 182.33 (SD = 7.54) and BMI of 29.1 cm. These athletes usually trained three to five times per week and also participated in local and state competitions. As data collection instruments were used an inverted platform tilted 30 degrees and an electromyography DelSYS® Myomonitor IV, synchronized and fired simultaneously. We analyzed the electromyographic signals of the lateral gastrocnemius (LG), tibialis anterior (TA), peroneus longus (FL), rectus femoris (RF), hamstring (IT) and gluteus medius (GM) of the dominant leg after ankle inversion movement.

RESULTS AND DISCUSSION

The literature regarding the application of cryotherapy with nerve conduction and motor control is controversial. It is pointed out that the application of cryotherapy immersion slows nerve conduction. Nevertheless, other authors state that there is no evidence for the reduction of motor neuron excitability in the peroneus longus muscle. The results of our study show a decrease in the electrical activity of the lower limb muscles after the use of immersion cryotherapy (Table 1).

CONCLUSION

There was a decrease in the electromyographic response of the gastrocnemius lateralis, rectus femoris and tibialis anterior ipsilateral foot submitted by immersion cryotherapy, which could interfere with motor control and may develop sports-related injuries. It points out that the results are related only to the small sample and the non-inclusion of the control group is a limitation of this study.

REFERENCES


Table 1: Effect of cryotherapy on the analyzed values up to 200 milliseconds after the opening of the inversion platform in RMS, the electromyographic response of the dominant lower limb muscles of athletes.

<table>
<thead>
<tr>
<th>Time of application</th>
<th>Cryotherapy before</th>
<th>After Cryotherapy (immediate)</th>
<th>After 10 minutes</th>
<th>After 20 minutes</th>
<th>After 30 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median</td>
<td>Median</td>
<td>Median</td>
<td>Median</td>
<td>Median</td>
</tr>
<tr>
<td></td>
<td>(min/max)</td>
<td>(min/max)</td>
<td>(min/max)</td>
<td>(min/max)</td>
<td>(min/max)</td>
</tr>
<tr>
<td>Lateral Gastrocnemius</td>
<td>28.97 (7.72 / 103.81)</td>
<td>12.60* (4.95 / 44.32)</td>
<td>13.59* (4.01 / 28.75)</td>
<td>17.27* (4.82 / 86.75)</td>
<td>14.64* (3.33 / 41.02)</td>
</tr>
<tr>
<td>Tibialis Anterior</td>
<td>36.91 (7.14 / 67.61)</td>
<td>17.05* (3.99 / 57.85)</td>
<td>18.66* (2.96 / 62.12)</td>
<td>20.97 (2.28 / 97.41)</td>
<td>17.99* (3.82 / 30.4)</td>
</tr>
<tr>
<td>Long Peroneal</td>
<td>34.26 (6.56 / 192.63)</td>
<td>22.12 (5.75 / 69.69)</td>
<td>17.17 (6.27 / 65.88)</td>
<td>17.47 (8.76 / 77.31)</td>
<td>18.53* (6.96 / 66.54)</td>
</tr>
<tr>
<td>Rectus Femoris</td>
<td>12.85 (7.51 / 24.67)</td>
<td>7.51* (3.89 / 21.29)</td>
<td>7.82* (2.95 / 12.91)</td>
<td>9.06* (2.29 / 15.09)</td>
<td>7.75* (2.99 / 89.58)</td>
</tr>
<tr>
<td>Hamstring</td>
<td>10.57 (5.41 / 335.17)</td>
<td>11.36 (4.09 / 337.18)</td>
<td>8.88 (4.59 / 338.26)</td>
<td>14.93 (3.49 / 338.63)</td>
<td>13.30 (3.81 / 339.16)</td>
</tr>
<tr>
<td>Middle Gluteal</td>
<td>46.14 (8.60 / 644.07)</td>
<td>39.78 (12.00 / 648.57)</td>
<td>45.43 (9.79 / 650.84)</td>
<td>42.05 (11.64 / 651.51)</td>
<td>47.020 (7.55/652.50)</td>
</tr>
</tbody>
</table>

*Significant difference of values compared to before cryotherapy.
ELECTROMYOGRAPHIC STUDY OF THE ORBICULARIS ORIS MUSCLE IN ORAL AND MIXED BREATHERS SUBJECTS

INTRODUCTION

The partial breathing (mixed breather) or full mouth (oral breather)1,2 are associated with inefficient breathing patterns of obstructive or non-obstructive 3,4 causes. Given these pictures, muscular impairments such as flaccidity might occur, causing changes from functions such as weak chewing to deviations in the skeletal development of the stomatognathic system.

However, it is not clear if there is a difference between the muscular behavior profiles of the oral and mixed breathers. The mixed breathers, in most cases, are neither considered3,5 nor grouped as oral breathers3. Understanding this behavior is important for the appropriate conducts, such as the orthonolaryngological and the mioterapic interventions to be adopted, to clear the airways and the restoration of the adequate oral functions in the speech, the deglutition and the mastication. Thus, ensuring the effective development of the stomatognathic system.

This study aims to investigate the pattern of muscle activity in oral and mixed breathers’ subjects of the orbicularis oris muscle (upper).

METHODS

This study has the approval of the research ethics committee from the Medical Sciences School, State University of Campinas (no 264/2009). Was performed at the Speech Therapy clinic, located at the Center for Study and Research in Professional Rehabilitation. Dr. Gabriel Porto/CEPRE/UNICAMP.

The review consisted of a control group with 16 volunteers with oral breathing and 16 volunteers with mixed breathing, ages between 6 and 12 years, healthy, males and females.

We investigated the possible differences in muscle activity patterns among subjects that were oral and mixed breathers.

The equipment used was a Myosystem BR1 electromyograph, with signal conditioner with 12-bit resolution, Common Mode Rejection (CMRR) of 112dB, 60 Hz and Analog Digital Converter.

The electrodes were the disposable bipolar Ag/AgCl, model Chicopee MA01 (Meditrace, Kendall-LTP), measuring one centimeter in diameter, and the reference electrode was placed over the volunteer’s sternum, and the electrode for the muscle captivation was positioned in the belly of the orbicularis oris muscle (upper). The movement required was the deglutition and the captivation time was of 5 seconds. The captivation was conducted with a 4000Hz sampling and the bandpass filter used was of 20 and 500 Hz In the signal processing. The Least Square Root (root mean square) was used for the muscle's average electrical activity.

RESULTS AND DISCUSSION

There were no significant differences in muscular behavior between the oral breathers group and mixed on the orbicularis oris muscle (upper) during deglutition.

By comparing the electromyographic recordings; the oral breathers group obtained 31.10 mean value and the mixed of the orbicularis oris muscle averaged 39.25. We can conclude from this, the existence of difficulty in the labial sealing, and in the fibers recruitment for the implementation of the deglutition function in both groups.

These findings disagree with authors2,5 who reported that mixed breathers might be disregarded, i.e., do not suffer any impairment. Moreover, they agree3 with the authors, reporting that the muscular behavior is similar between the groups.

We can also conclude, that the fact that the patient breathes through the nose, can also cause damage throughout the development.

REFERENCES

INTRODUCTION

The cicatricial retraction is characterized by the shortening of the muscular fibers, caused by the increase of collagen, resulting from failure in the surgical techniques. Aesthetic and functional impairments are expected in such cases.

Labiopalatal fissure is a congenital cranium-facial anomaly, characterized by a local cleft; in Brazil, it occurs in nearly one of 750 births. The corrective surgeries are performed at an early age; at three months old on the lip and at 18 months old on the palate. Since the muscles are still small, complications in the incision site and with the sutures are common, and impairments such as cicatricial retraction may occur.

The skeletal conformation has a direct relationship to the muscular function, and in the case of muscular compromises, osseous changes may occur.

As the child is still in development, the implementation of a proper muscular function becomes necessary to guarantee the correct skeletal growth.

This study aims to compare the pattern of electrical activity from the orbicularis oris muscle (upper) in subjects with and without cicatricial retraction.

METHODS

This study has the approval of the research ethics committee from the Medical Sciences School, State University of Campinas (n° 264/2011). And, it was performed at the Speech Therapy clinic, located at the Center for Study and Research in Professional Rehabilitation. D.r Gabriel Porto/CEPRE/UNICAMP.

The review consisted of a control group of six volunteers without compromise, and an altered group of six volunteers with labial cicatricial retraction resulting from corrective surgery for labiopalatal fissure, ages between 6 and 12 years, healthy, males and females.

The pattern of muscular activity was investigated by surface electromyography in the orbicularis oris muscle.

The equipment was a version 4.0 Bioresearch electromyography, signal conditioner with 12-bit resolution with Common Mode Rejection (CMRR) of 112dB, 60 Hz and Analog Digital Converter.

The electrodes were the disposable bipolar Ag/AgCl, model Chicopee MA01 (Meditrace, Kendall-LTP), measuring one centimeter in diameter, and the reference electrode was placed over the volunteer's sternum, and the electrode for the muscle captivation was positioned in belly of the orbicularis oris muscle (upper). The requested movement was the labial suctioning for 5 seconds. The captivation was conducted with a 1000 Hz sampling and the bandpass filter used was of 20 and 500 Hz In the signal processing. The Least Square Root (root mean square) was used for the muscle's average electrical activity.

RESULTS AND DISCUSSION

When comparing the average electrical activity of the orbicularis oris muscle, in subjects with and without cicatricial retraction, we detected significant differences between the groups.

In patients without cicatricial retraction, the suction cycles were clearly demarcated, with the increase and decrease of the balanced activity and with systematic intervals between cycles.

Conversely, in subjects with cicatricial retraction it was impossible to detect the cycles in the suctioning. According to Figure 1, the patient with cicatricial retraction (A) is unable to suction properly, unlike what occurs in individuals without cicatricial retraction (B) whose cycles have been clearly demarcated.

These results can be verified quantitatively with the RMS values obtained, where the subjects with cicatricial retraction had mean of 6 μV and for the group without cicatricial retraction was of 23 μV.

This data is in agreement with Maio and Ribeiro (2001) who stated that when the natural course of healing is impaired, functional disability might occur.

REFERENCES

ELECTROMYOGRAPHIC EVALUATION OF PELVIC FLOOR IN VOLLEYBALL ATHLETES AND SEDENTARY NULLIPAROUS: A PILOT STUDY

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INTRODUCTION
The high demand for exercise and sports has been intensified in different ways in all social classes. Some studies have shown that female athletes have increased pelvic floor dysfunction due to high impact physical activities, in addition to physical activity other risk factors for development of pelvic floor disorders, such as age obesity, pregnancy, vaginal delivery, smoking. The sport in excess is not healthy, but can provide a level of injury with sharp pain conditions. The importance of physical activity on the pelvic floor muscles is still little known inside society. The loss of urinary continence is a situation of discomfort and stress for the women. 50% of women at some stage in their lives and 60% of women aged over 60 years show the loss of urinary continence. Therefore, the aim this study is to evaluate pelvic floor muscle activity in volleyball athletes and sedentary nulliparous through the data of electromyography.

METHODS
Clinical Prospective Study. In The sample 10 volunteers were included. Sedentary Nulliparous SN (n=05) and volleyball athletes (AV) (n=05). The protocol evolution and consisted of: (a) evaluation the personal data (b) functional assessment of the pelvic floor (APF), by digital palpation and grading muscle contractility, according Oxford Scale (graduate of zero to five), and (c) assessment of the pelvic floor electromyography (EMG System® Brazil) by means of endovaginal probe Physio-Med Services®) to check the floor muscle contractility pelvic in microvolts (μV).

RESULTS AND DISCUSSION
The volunteers average age was 36.

The EMG values from sedentary nulliparous were inferior than the values from athletes volleyball. The average found were 25.53 (DP+-27.43) e 3.02 (DP+-1.15) , accordingly. Therefore, there was no significant difference between the groups (p >0.05). Studies showed 28% urinary loss during the physical activity in nulliparous athletes with average age of 19.94.

| Source: by autor |

<table>
<thead>
<tr>
<th>Table 1 - The sample profile.</th>
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<tbody>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Average</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2 - Electromyographic data Values expressed as mean ± standard deviation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volleyball Athletes</td>
</tr>
<tr>
<td>EMG-RMS</td>
</tr>
</tbody>
</table>

| Source: by autor |

Thus mechanical injuries that result in beating to the integrity of the tissues of the pelvic floor, raising to the weakness of these tissues. Studies discuss the specialized intervention directed to the professionals involved with the athletes, incentivating them to include preventive and therapeutic care aiming the strengthening of the pelvic floor. This preventive care will decrease the urogynecologic occurrence improving life quality of this feminine population.

CONCLUSION
Due to discrepancies indices displayed electromiographic data is need for continued study thus verifying the sample and increasing the small number of the participants volunteers.

REFERENCES

ELECTROMYOGRAPHY AS A TOOL FOR ASSESSMENT OF DIAGNOSIS AND TREATMENT OF HEADACHES
TENSION THROUGH FUNCTIONAL OCCLUSAL ADJUSTMENT A PILOT STUDY

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INTRODUCTION

A tension headache (TH) is a heterogeneous disorder of central and local origin, with many possible etiologic factors, including muscle tension involving the head and neck muscles, psychosocial stress, poor posture and others. The objective of this study was to investigate the relationship between occlusal anatomy and electromyographic activity of masticatory muscles in cases of Tension Headache.

Description of case

It was investigated the occlusal status of a 48 years’ volunteer with all the teeth, Angle Class I occlusion, stable, complaining of headache in the right side of forehead and clenching at night, and who made the diagnosis of neurological Tension Headache since 9 years ago.

METHODS

It was performed palpation of masseter and temporal muscles at the time of the first dental contact during Maximal Intercuspal Position (MIP). It was evaluated the distribution of occlusal forces of occlusal origin, after contacts were been marked with articulating paper Bausch. Based on the information, it was made a Functional Occlusal Adjustment (FOA) by reduction of the restorative material. For the electromyography equipment was used BIOEMG1000 (Lynx ® São Paulo, SP, Brazil). It was collected electromyographic activity of muscles Masseter (M) and Temporal (T) on both sides and Suprahyoids (SH) (SH) during Rest and MIP functions. The collections were performed after occlusal intervention after one, three and ten weeks.

It was made evaluation of pain by Visual Analog Scale (VAS), beyond the pre assessment by Research Diagnostic Criteria (RDC).

RESULTS AND DISCUSSION

The adjustments that change the usual position of the jaw may be a result of the direction of muscular work when performed differently than normal3. The knowledge of biomechanics identifies occlusal imbalances that direct the positioning of the jaw muscles by changing the work directly or indirectly related to it2,3. The FOA was carried out with the intention of promoting improvement in balance and symmetry of activity in the masticatory muscles, through information provided by the occlusal anatomy and muscular palpation1.

The data obtained by EMG, aided by a mathematical routine, allowed evaluation of the order and duration of the first activation of the muscles examined, informed by the direction of occlusal forces home.

It was found the first tooth contact on the right side, with a resultant to the right side, the order of activation was on average by Right Masseter (RM) and Left Temporal (LT) 17ms, suggesting the centralization of the condyle in the articular cavity of the right side, and after 12 ms were activated by the RM and Right Temporal (RT) 77 ms, which suggests an overload factor in muscle TD that can be explained by occlusal imbalance revealed by articulator paper marks over the occlusal surfaces, while MIP, especially in each swallowing, which estabilize the jaw4, a phenomenon that occurs approximately 600 to 2000 times each 24 hours.

After using Functional Occlusal Adjustment’s technique, RM muscle showed an improvement in electromyographic activity of 68.62% at Rest and 54.84% in the PIM, and LT muscle of 78.75% at Rest and 50.74% in the PIM compared to pre collection. After 10 weeks LT remained with 57.78% improvement with 68.22% and RM at Rest, and 74.54 and 84.25% in the PIM.

After one week the Masseter muscles have achieved an improvement in symmetry at about 98% and Temporal muscles 80.87% (Rest) and 68.27% for the Temporal, and 93.26% for the Masseter (PIM).

Post occlusal intervention, the pain decreased 100% for all muscles studied by VAS, and have being remained stable after 10 weeks even after having been a patient under of general state of tension and presenting clenching, and other occlusal imbalances those weren’t covered during the session of the FOA.

CONCLUSION

There was a change in the electromyographic activity of the muscles studied after Functional Occlusal Adjustment, justified by the relationship between activity of masticatory muscles and occlusal anatomy. There was overall improvement in reporting of pain. This study suggests that DDS has an important role in diagnosing and treating occlusal order imbalances that may be part of the type of tension headache, which must be addressed multidisciplinary.

Functional Occlusal Adjustment suggests to be an alternative treatment and effective solution for order imbalances and muscle discomfort related to head and neck, but randomized studies are needed with larger populations.

REFERENCES


Figure 3 - VAS values before and after FOA

Braz J Oral Sci. 11(2):158-347
ELECTROMYOGRAPHY OF THE TRUNK MUSCLES IN EXERCISES DIFFERENT OF SIDE PLANK

INTRODUCTION

The stability of the trunk or more specifically the pelvic-lumbar region of the body, is critical to providing a basis for the motions of upper and lower load bearing and protect the spinal cord and nerve roots (Oliver et al., 2010). According Behm et al. (2010), the trunk muscles can be divided into two different groups according to their specific functions of stabilization, the local stabilizers (multifidus, transversus abdominis) and global (rectus abdominis, external abdominal oblique and erector spinae). Strengthening these muscles is an option for people seeking to prevent and/or alleviate pain in the lumbar region. Thus, Oliver et al. (2010) analyzed the electrical activity of trunk muscles four during isometric stabilization exercises (bridge, bridge with leg elevation, Superman and flying squirrel), demonstrating that exercise superman and flying squirrel produced greater activity global muscles analyzed. Investigations have been conducted to determine the most efficient and proper to perform trunk stabilization isometric exercises (Desai & Marshall, 2010), however, many variations made to these exercises, specifically on the side plank, are widespread in the practice of training with no systematic analysis of the same. Thus, there is a gap in the literature on periodization side plank exercises based on electromyographic findings. Therefore, objective of this study was to compare the electromyographic activity of muscles Rectus Abdominis (RA) and multifidus (MU) during the execution of five isometric exercises the side plank.

METHODS

The sample included male volunteers five active physically without neuromuscular dysfunction. Data collection was performed using a single differential surface electrodes with a gain of 10 times and ratio of common mode rejection of 92dB at 60Hz and recorded by a computerized EMG system designed according to international standards (P84 MyosystemBr1 / DataHominis Technology Ltd., Uberlândia, MG, Brazil), which has an input impedance of 1015 ohms, converter analog /digital with resolution 16-bit, 15Hz high pass filter, low pass filter programmable by software (250Hz, 500Hz, 1000Hz or 2000Hz) and integrated rechargeable battery for total portability. The MyosystemBr1 P84 was connected to a laptop / notebook powered only by battery, thus the use of batteries for both devices (laptop and electromyography) ensured the almost total absence of interference of 60Hz. The electromyographic signal was quantified by the Root Mean Square (RMS) and normalized (RMSn) by Maximal Voluntary Isometric Contraction.

The signals were subjected to a high-pass filter of 20 Hz and low-pass and 500 Hz sampling frequency used was 2000 Hz by channel. The electrode surface of the RA muscle was placed at a point lateral centimeters three (cm) and cm five above the umbilicus (Cram, 2008) and MU the electrode was fixed at the level of the spinous process of the lumbar vertebra fifth about 2 to 3 cm from the midline of the body (SENIAM). The reference electrode was fixed on the left anterior superior iliac spine. The collection time of EMG activity was 10 seconds on each exercise, which was performed in five variations according to different points of ground support (PL1-lateral position with the support of hip, thigh, leg, elbow and right forearm; PL2-lateral position with the support of the foot, elbow and right forearm; PL3-lateral position with the support of the right leg, right elbow and forearm; PL4-lateral decubitus with support on hand and right foot, PL5- lateral decubitus with support on hand and right foot (contralateral limb abducted). Data were analyzed using parametric statistics, using student’s t test.

RESULTS AND DISCUSSION

Comparing the mean values of RMSn RA and MU muscles, it is observed that in the PL1, PL2, PL4 and PL5 exercises no significant difference, however, in PL3 exercise the RMSn MU was significantly higher than RA (p<0.03).

CONCLUSION

In most exercises side plank was shown the greatest recruitment of MU as compared to RA, however, only exercise PL3 showed significant differences. These exercises may be used to diversify a training program of the trunk and are particularly suitable for the development of muscular endurance.

REFERENCES

ELECTROMYOGRAPHY THE TIBIALIS ANTERIOR MUSCLE IN PROPRIOCEPTIVE EXERCISES WITH OPEN AND CLOSED EYES

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INTRODUCTION

Proprioception is the term that describes the perception of own body, and includes awareness of posture, movement, body parts and changes in the balance, and include the sensations of movement and joint position (Lent, 2001.) The proprioceptive exercises a great show prophylactic action and rehabilitation in musculoskeletal injuries, the sensory modality they require a more competent to obtain information concerning the sense of movement and joint position, based on elements from other sources than the visual, hearing or the skin surface (Baldacino et al., 2010).

Ferreira et al. (2008) evaluated the electromyographic activity of ankle muscles in the proprioceptive exercises with stable and unstable soil (beam and trampoline), using open and closed eyes. The results showed a significant increase in electrical activity during exercise with closed eyes. Another study, Ferreira et al. (2009) analyzed the electromyographic activity of ankle muscles in the proprioceptive exercises with stable and unstable soil (proprioceptive disc, trampoline, elastic bed), who concluded that the exercises in unstable soils produced significantly increased electrical activity.

Investigations have been conducted to determine the pattern of activation of ankle muscles in different proprioceptive exercises, however, gaps exist in the literature on the electrical activity of the tibialis anterior (TA) when comparing trampoline and freeman disc devices with open and closed eyes.

Thus, the objective of this study was to analyze the electromyographic activity in the TA muscle in trampoline and freeman disc exercises with open and closed eyes.

METHODS

The sample included 10 male volunteers active physically (obtained through a questionnaire) aged between 22 and 34 years. This study was approved by the Ethics Committee (CEP) of the Triangle University Center (UNITRI) n° 728200.

Data collection was performed using a single differential surface electrodes with a gain of 20 times and ratio of common mode rejection of 92dB at 60Hz and recorded by a computerized EMG system designed according to international standards (P84 MyosystemBr1 / DataHominis Technology Ltd., Uberlândia, MG, Brazil), which has an input impedance of 1015 ohms, converter analog /digital with resolution 16-bit, 15Hz high pass filter, low pass filter programmable by software (250Hz, 500Hz, 1000Hz or 2000Hz ) and integrated rechargeable battery for total portability.

The MyosystemBr1 P84 was connected to a laptop / notebook powered by the Root Mean Square (RMS) and normalized (RMSn) by Maximal Voluntary Isometric Contraction.

The signals were subjected to a high-pass filter of 20 Hz and low-pass and 500 Hz sampling frequency used was 2000 Hz by channel. The electrode surface of the TA muscle was fixed at a thirds two point of the line between the lateral condyle of the tibia and lateral malleolus of the fibula (SENIAM). The reference electrode was fixed on the styloid process of the ulna.

The collection time of EMG activity was 10 seconds for each soil, using the time of one minute of rest between collections and order of execution of the exercises was randomized. The data were analyzed using parametric statistics, using Student’s t test.

RESULTS AND DISCUSSION

Comparing the mean values of RMSn the TA muscle was observed significant difference (p<0.05) between exercises trampoline - open eyes (TRA-OE) and trampoline - closed eyes (TRA-CE) and disc Freeman - open eyes (DIS-OE) with disc Freeman - closed eyes (DIS-CE). There was no significant difference (p> 0.05) between exercises TRA-OE and DIS-CE, and TRA-CE with DIS-CE.

Ferreira et al. (2008) demonstrated recruitment greater of leg muscles on the trampoline with closed eyes compared with open eyes. The findings of this study corroborate with statements from Ferreira et al. (2008), highlighting the importance of the visual system in the body proprioception, emphasizing its action in postural control and implications possible in the rehabilitation process. Ferreira et al. (2009) used a collection time of 15 seconds on exercise each, the study present, the time taken was 10 seconds, because balance difficulty great mostly with closed eyes.

The execution of proprioceptive exercises with closed eyes can be a viable option to diversify a training program and / or physical rehabilitation and at the same time, an desirable alternative and necessary at specific stages of rehabilitation programs and training due to increased instability and difficulty the realization of movement.

CONCLUSION

The proprioceptive exercises performed with closed eyes resulted in a higher electromyographic activity of tibialis anterior, however, when comparing the trampoline and freeman disc exercises in the same situation (TRA-OE and DIS-OE / TRA-CE and DIS-CE) is observed that the electrical activity of muscle was similar.

REFERENCES

2. Ferreira LAB et al. 21st Brazilian Congress of Biomedical Engineering, 2008, Sao Jose dos Campos. Comparison of electromyographic dynamic stabilizers of the ankle with open and closed eyes, 1715-18.
INTRODUCTION

Patellofemoral pain syndrome (PFPS) is a common biomechanical dysfunction affecting one in four individuals from the general population, mainly affects young female people¹. The etiology is controversial and several factors may elicit the PFPS. However, several studies point out that one of the main factors involved in the etiology of this dysfunction is the imbalance between the vastus medialis and lateralis muscles, which would lead to a lateralization of patella²-⁵. This work purports to compare the electrical activity of vastus medialis and lateralis muscles in healthy people and with PFPS.

METHODS

Twenty eight individuals of both genders, sedentary or that did not practice physical activity in a regular basis, took part in the study. The volunteers were divided into two groups, eight clinically healthy (22.7 years old ± 3.9; 75.1 Kg ± 11.1; 1.70 m ± 0.06) and twenty that had PFPS(25.2 years old ± 5.5; 71.4 kg ± 12.5; 1.69 m ± 0.08).

After selection, we proceeded with the physical, electromyographical and radiological assessment of individuals. The electromyography was performed using electromyographical biofeedback device Myomed 932 (Enraf Nonius, Netherlands). With the patient sitting on a Bonnet Chair, disposable surface electrodes were fixed in bipolar configuration, positioned in the belly of the lateral and medial vastus, in accordance with the recommendations of the SENIAM. A reference electrode was fixed on the patellar tendon. There were three maximum voluntary isometric contractions (MVIC), at angles of 120° and 180°, having 10 to 30 seconds of rest between the contractions. Patelofemoral alignment was measured by axial radiological examination of Patella (method of Merchant).

For statistical analysis, we considered the following dependent variables: EMG amplitudes of VMO and VL at 120°, normalized by the EMG amplitude for these muscles at 180°, and VMO-VL difference for each group. Mann-Whitney test was used to compare the VMO / VL relation for each group and also VMO-VL difference between the experimental and control groups. For all analyses it was adopted a significance level of 5% and used the software SPSS, version 16.

RESULTS AND DISCUSSION

The results of the electromyographic evaluation are shown in Table 1.

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Median (%)</th>
<th>Stand Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMO/VL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>26</td>
<td>89</td>
<td>0.88</td>
</tr>
<tr>
<td>Control</td>
<td>16</td>
<td>87</td>
<td>1.09</td>
</tr>
<tr>
<td>VMO-VL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>26</td>
<td>-14</td>
<td>0.10</td>
</tr>
<tr>
<td>Control</td>
<td>16</td>
<td>-6.8</td>
<td>0.08</td>
</tr>
</tbody>
</table>

There were no significant differences in the VMO / VL relation and VMO-VL difference for both clinically healthy individuals and those with PFPS, at different angles of contraction.

The electromyographic activation of the VL was always above to the VMO. Although there is no significant difference in VMO/VL rate for both groups, the fact that the majority of subjects in this study (83.3%) submit medial deviation of the patella, might have influenced the outcome of the EMG activity since several studies indicate a tendency for lateral patellar displacement.

The results that were reported in this work were not able to confirm the hypothetical imbalance in the electric activation between the VMO and VL when compared the individuals with PFPS and those who are healthy examined under conditions which were described before. These results, although obtained under different experimental conditions, corroborate those reported by Santos at al⁴, as the results of their study did not indicate significant differences in the VMO / VL relation, in a closed chain activity, among individuals considered clinically normal and those with PFPS. On the other hand, these results differ from those found in literature with regard to EMG activity between the muscles VMO and VL, which indicates a decrease in VMO activity in relation to the VL in PFPS group, although it is pointed out that the EMG measurement angles were different from the current study. The PFPS is multifactorial and can determine the pain, especially, through the action of high magnitude compressive forces located in the medial and lateral compartments.

Therefore, it is suggested that one of the etiological factors of this syndrome is the imbalance of the VMO/VL relationship that causes the patellar misalignment; however, not always this imbalance will favor the VL, as in cases of individuals who have the patella in medial deviation, as verified in this study.

CONCLUSION

In the experimental conditions tested, it was detected that healthy individuals and those with PFPS had a similar VMO/VL rate. Furthermore, a change in patellar alignment has been detected in most subjects with a tendency of PFPS sample presents a medial deviation of the patella.

REFERENCES

EMG ACTIVATION OF LUMBAR MULTIFIDUS AFTER INTERVENTION WITH PILATES IN THE ELDERLY: PILOT STUDY

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INTRODUCTION

The decrease of autonomy in the elderly decreases the mobility, with a significant decrease in mass, culminating in an impairment of segmental stabilization with deficit functional and balance (Roberts et al, 2010). Pilates is a therapy that aims to strengthen the abdominal muscles through low impact muscle exercises contractional (McNeill, 2011; Bertolla et al, 2009), contributing to the improvement of stability target. Given that activation of the deep muscles of the abdomen is fundamental in the stabilization target, the objective of this study was to evaluate the activation of the multifidus and transverse muscles of the abdomen after 11 weeks of targeted training.

METHODS

This research is a descriptive case study of a student, 66 years, the Open University of the Third Age (UATI) of the Federal University of Triangulo Mineiro (UFTM). The study was divided into: initial assessment; training; final evaluation. The activation of the multifidus muscles and transversus abdominis (indirectly), was assessed by surface electromyography of the bilateral lumbar multifidus in a single voluntary contraction, normalized by the peak signal. Data were collected using electromyography Miotool 400 (Miotec Biomedical Equipment Ltda, Porto Alegre, Brazil), using differential active sensors, sampling frequency of 2000 Hz, gain of 100x, A / D converter 14 bit rate, common mode rejection of 110 db and input impedance of 10 Ohm. The data were treated with band-pass filter 10 to 500 Hz and analyzed using the software Miograph (Miotec Biomedical Equipment Ltda, Porto Alegre, Brazil). The positioning of sensors followed the recommendations of the protocol SENIAM (Surface Electromyography for Non-Invasive Assessment of Muscles), using electrodes of Ag / AgCl self-adhesive solid gel (MAXICOR Medical Products LTD, Pinhais, Brazil), disc-shaped with 1 cm in diameter and 3 cm apart center to center.

To collect, the subject was positioned prone, with support in the abdomen, skin shaved and clean, the recommendations of observing Isek (International Society for Electrophysiology and Kinesiology). The sensors were placed bilaterally in L5 level and aligned to the line formed by the posterior superior iliac spine and the intervertebral space L1/L2 (2-3 cm from the midline), following the direction of muscle fibers. The reference electrode was placed over the spinous process of C7. Previously, a collection of 30 seconds at rest was performed to ensure signal quality. Then, the volunteer was instructed to raise the stem as much as possible and sustain for 5 seconds. The evaluation was repeated at the end of the training period by the same raters.

The training was performed at 11 weeks, with sessions of 40 minutes, 2x per week. The exercises were targeted, being changed every four weeks, with progressive requirement.

In 1-4 weeks the focus was on the activation and kinesthetic deep abdominal muscles (transversus abdominis and multifidus) and posterior muscular chain elongation. In weeks 5-8, focused on strengthening superficial muscles (rectus abdominis and obliques) and deep abdominal, and stretching of the posterior chain. In weeks 9-11, the goal was the strengthening of the posterior muscles of the trunk and upper and lower limbs, with training coordination.

RESULTS AND DISCUSSION

It is expected that direct muscle activation controlled neuromuscular strategy promoting stability of the lumbar region. Thus, the values listed in table 1 with emphasis on peak and% IEMG infer the reasoning that the differences in electrical activation occurred due to reduced need for recruitment of motor units in time and intensity appropriate for the action of the deep muscles, creating learning and stability.

CONCLUSION

The proposed protocol directs the strategy neuromuscular learning and ensuring mechanical stability functional.

REFERENCES


<table>
<thead>
<tr>
<th>Right</th>
<th>Left</th>
</tr>
</thead>
<tbody>
<tr>
<td>Med RMS (μV)</td>
<td>45.20</td>
</tr>
<tr>
<td>Max RMS (μV)</td>
<td>136.10</td>
</tr>
<tr>
<td>% pico</td>
<td>33.20</td>
</tr>
<tr>
<td>IEMG (μV.s)</td>
<td>45161</td>
</tr>
<tr>
<td>FM (Hz)</td>
<td>11572</td>
</tr>
<tr>
<td>Med RMS (μV)</td>
<td>3380</td>
</tr>
<tr>
<td>Max RMS (μV)</td>
<td>9670</td>
</tr>
<tr>
<td>% pico</td>
<td>34.90</td>
</tr>
<tr>
<td>IEMG (μV.s)</td>
<td>33685</td>
</tr>
<tr>
<td>FM (Hz)</td>
<td>13843</td>
</tr>
</tbody>
</table>

Med = medium, max = maximum, RMS = Root Mean Square, % = percent; IEMG = integrated electromyographic signal, FM = median frequency.
EVALUATION OF FATIGUE OF MUSCLE LUMBAR MULTIFIDUS IN INDIVIDUALS WITH LUMBAR DISC HERNIATION

INTRODUCTION

Chronic low back pain can be defined as pain persisting for more than 12 weeks in the levels of the lumbar and sacral spine. A common reason for low back pain is disc herniation. The lumbar multifidus muscle (LM) is preferentially affected in episodes of nonspecific low back pain, promoting morphological, and structural changes, and difficulty in motor control. Therefore, the aim of this study was to evaluate the LM fatigue, pain and functional disability in patients with lumbar disc herniation.

METHODS

This study examined 51 subjects divided into two groups: Lumbar Disc Herniation (LDH) (pain for more than three months) (n = 28, age 44.78 ± 6.72, BMI 26.36 ± 2.78) and Control Group (CG) (no pain) (n = 23, age 39.2 ± 8.38, BMI 24.12 ± 2.14). The fatigue assessment consisted of an isometric extension of the spine (Sørensen test), with concomitant measures of LM fatigue measured by surface electromyography (EMG), pain (visual analogue scale - VAS) and functional disability (Oswestry). We used the t test* and Mann-Whitney** for variables with normal distribution and non-normal, respectively. The significance level was 5%.

RESULTS AND DISCUSSION

Analysis of fatigue for the electromyographic parameter (median frequency - MF) both groups showed a decrease of the frequency spectrum from beginning to end of assessment, however the LDH group showed significant reduction in spectrum, allowing the installation of fatigue in less time. The LDH group obtained moderate pain intensity and minimal functional disability.

CONCLUSION

The LDH group compared to the CG showed higher fatigue LM, lower tolerance endurance time (Sorensen), which may be due to the intensity of moderate pain and minimal functional disability.

REFERENCES


Table. Median frequency, endurance time, pain and functional disability

<table>
<thead>
<tr>
<th>Variables</th>
<th>LDH (n=28)</th>
<th>CG (n=23)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>MF initial (Hz)</td>
<td>155.8 (23.07)</td>
<td>179.6 (21.13)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>MF end (Hz)</td>
<td>142.6 (26.21)</td>
<td>164.4 (25.16)</td>
<td>0.004*</td>
</tr>
<tr>
<td>Endurance (0-240 s)#</td>
<td>157.5 (72.5)</td>
<td>240 (0)</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>Pain (0-10 cm)#</td>
<td>6.4 (1.98)</td>
<td>N/A</td>
<td>-</td>
</tr>
<tr>
<td>Functional disability (0-45%)#</td>
<td>17(3.02)</td>
<td>N/A</td>
<td>-</td>
</tr>
</tbody>
</table>

# Normal range
EVALUATION OF IMMEDIATE RESPONSE AFTER THE APPLICATION OF THE TECHNIQUE OF ISCHEMIC COMPRESSION IN INDIVIDUALS WITH MYOFASCIAL TRIGGER POINTS

INTRODUCTION
The term “myofascial pain syndrome” or “pain syndrome of myofascial trigger points” has been used to describe a specific clinical manifestation of muscle pain that is derived from a myofascial trigger point (PGM). In this scenario, ischemic compression therapy (IC) is an alternative therapy in order to relieve pain and restore normal muscle function. This technique is based on the mechanism of muscle compression, however there is no consensus on the amount of pressure to be applied as well as a clearer definition of the actual mechanism of this technique for the mitigation of PGM in the trapezius muscle.

METHODS
This study examined 17 subjects, divided into two groups: Ischemic Compression (GCI) (n = 7, age 23.16 ± 1.42, BMI 22.52 ± 3.28) and Placebo Group (PG) (n = 10, age 22.8 ± 0.97, BMI 24.23 ± 2.53). We evaluated the electrical activity during rest of the upper trapezius (UT) by means of electromyography and normalized by maximum voluntary contraction (MVC) and the pain threshold through the algometer. We used the Shapiro-Wilk test for normality and evaluation of data. We used the t test* and Mann-Whitney** for variables with normal distribution and non-normal, respectively. The significance level was 5%.

RESULTS AND DISCUSSION
In analyzing the pattern of activity during the rest of the UT both groups showed a decrease in activity, however no significant difference between groups. Regarding the pain threshold, both groups showed a decrease in sensitivity to pain, but without significant differences between groups. Gemmell et.al, evaluated the pain threshold of the trapezius muscle after application of ischemic compression for 60 seconds, and the results indicated that the sensitivity decreases significantly, indicating that there was and the need to apply more pressure so that he could reach the pain threshold, confirming the results found in our study.

CONCLUSION
Based on the results of this study there was no difference in pain threshold and EMG activity patterns between the CI and GP groups before and after treatment.

REFERENCES
EVALUATION OF MASTICATION ON PATIENTS TREATED OF HEAD AND NECK CANCER

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INTRODUCTION
In front of the eight million new cancer cases that occurs today worldwide of which 212,000 are initiated on mouth, is necessary to study more influences of head and neck cancer treatments on mastication. In most part of head and neck cancer, on initial fase, the treatment is radioteraphy, cirurgery if necessary and quimioteraphy maybe (Parise, 2008). Some treatments can cause the mechanical interruption or alteration of aerodigestive superior part that can interfere on function of stomathognatic system (Jotz et al., 2003). The aim of this clinical study was to evaluate the electrical activity of temporal and masseter muscles of patients submitted to head and neck cancer treatment (G1) and compare this data with those person that had never received this type of treatment (G2). This study can give us criterious to masticatory system analyses of patients treated of head and neck cancer.

METHODS
The experimental group consisted of 9 patients (mean age 55 years) with head and neck cancer treatment finalized at least 6 months (G1). This cancer treatment was based on radiotherapy focused on local of different types of cancer lesions associed or not to chemoterapy or cirurgy. The control group consisted of 9 dentate subjects paired with experimental group according to age, gender and oral situation (G2). The electromyographic (sEMG) activity of masseter and temporalis muscles was carried out at situations: rest, protrusion, right and left laterality, opening and closing mouth, parafilm clenching and chewing. Inter-group comparisons were made using independent sample t-test. Significance level was set at P<0.05.

RESULTS AND DISCUSSION
There were no statistic differences between groups in all tested clinical situations. (rest: G1=0.43 and G2=0.23; protrusion: G1=0.37 and G2=0.35; right laterality: G1=0.42 and G2=0.39; left laterality: G1=0.36 and G2=0.34; opening and closing mouth: G1=0.47 and G2=0.36; parafilm clenching: G1=1.27 and G2=1.14; parafilm chewing: G1=0.78 and G2=0.67) (Figure 1). This result may have been influenced by the fact that patients were evaluated at least 6 months after completion of their radiotherapy, chemotherapy or surgical. This fact gives evidence that these treatments have no significnt residual effect on the electrical activity of masseter and temporal muscles during both the maintenance of postural position and during chewing activity. Other studies are being conducted in patients during treatment of head and neck cancer to check the interference of these treatments in the activity of the masseter and temporal largely responsible for chewing.

CONCLUSION
Results of this study showed that head and neck cancer treatments have no bad residual effects on electrical activity of masticatory muscles.

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ACKNOWLEDGMENTS
FAPESP (2010/10472-9).

Figure 1: Electromiography activity (RMS) of right masseter (RM), left masseter (LM), Right Temporalis (RT) and Left Temporalis (LT) muscles, measured during clinical situations: rest, protrusion, right laterality, left laterality, opening and closing mouth, parafilm clenching and parafilm chewing.
EVALUATION OF MASTICATORY MUSCLES THICKNESS IN SUBJECTS WITH AND WITHOUT TMD

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INTRODUCTION
The masticatory muscles, including the jaw elevators, are commonly affected in cases of TMD (Chandu et al., 2005), fact able to impaired in its functional efficiency with changes in its morphofunctional characteristics (Liu et al., 1999). Thus, the ultrasonography (US) may be considered a reliable technique for evaluation of masseter and anterior part of temporal muscles in patients with TMD (Emshoff et al., 1999), permitting a better understanding of the participation of these structures in performing the functions of the stomatognathic system.

The aim of this study was to evaluate the thickness of masseter and anterior part of temporalis muscles by means of ultrasonography (US), in adults with and without TMD.

METHODS
The sample consisted of 47 individuals of both genders, with 28 included in the control group (mean age 25.9±4.7 years old) and 19 in the TMD group (25.4±3.8 years old), classified according the Research Diagnostic Criteria (RDC / TMD).

The US (figures 1 and 2) were evaluated for the masseter and anterior part of temporalis at rest and during maximal voluntary contraction (MVC) (dental clenching), bilaterally.

Data were obtained by mean of three repetitions and, for each individual, the mean values of left and right sides was used.

Data normality was checked by Shapiro-Wilks and the data comparisons were evaluated by unpaired t test (p ≤ 0.05).

RESULTS AND DISCUSSION
The results showed significant differences between the masseter muscle thickness, when compared the TMD and control groups, at rest (Mean 11.2; Standard Deviation ± 1.9 for TMD and 12.7 ± 1.9 for control) and during dental clenching (13.4 ± 1.9 for TMD and 14.8 ± 2.0 for control), being the dysfunctional individuals with lower values of US.

Significant data also observed between the rest state and MVC for masseter and temporal muscles in both groups with higher scores of US during dental clenching.

CONCLUSION
It can be concluded that patients with TMD show a lower thickness of masseter muscle, demonstrating that the presence of dysfunction may affect the morphological characteristics of these musculature.

REFERENCES

ACKNOWLEDGEMENTS
The authors gratefully acknowledge the financial support from FAPESP (Foundation for Research Support of São Paulo - Brazil) and to State University of Campinas for contribute to this work.
EVALUATION OF RESPONSE IMMEDIATELY AFTER APPLICATION OF THE TECHNIQUE IN PATIENTS WITH DRY NEEDLING MYOFASCIAL TRIGGER POINTS

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INTRODUCTION
The term “myofascial pain syndrome” or “pain syndrome of myofascial trigger points” has been used to describe a specific clinical manifestation of muscle pain that is derived from a myofascial trigger point (PGM). Currently the technique of Dry Needling (DN) has been used in individuals diagnosed with PGM. The practice requires an experience in palpation and localization of tight muscle bands and trigger points followed by needling. But the underlying mechanism of such treatment seems to be unknown. The aim of this study was to evaluate the immediate effects of the technique of Dry Needling in patients with myofascial trigger points.

METHODS
This study examined 18 subjects, divided into two groups: Dry Needling (DNG) (n = 8, age 23.33 ± 1.21, BMI 22.80 ± 2.86) and Placebo Group (PG) (n = 10, age 22.8 ± 0.97, BMI 24.23 ± 2.53). We evaluated the electrical activity during rest of the upper trapezius (TS) using electromyography and normalized by maximum voluntary contraction and the pain threshold through the algometer. We used the Shapiro-Wilk test for normality and evaluation of data. We used the t test * and Mann-Whitney ** for variables with normal distribution and non-normal, respectively. The significance level was 5%.

RESULTS AND DISCUSSION
Analysis of the pattern of activity during the rest of superior trapezius in the DNG showed an increase in activity, while PG showed a decrease, however no significant difference between groups. Regarding the pain threshold, both groups showed a decrease in sensitivity to pain, but without significant differences between groups. The effectiveness of DN for the relief of pain is inconclusive. Irnich et. al reported that pain intensity measured by visual analog scale (VAS) after application of the technique of DN has not obtained a statistically significant difference compared to placebo.

REFERENCE

REFERENCE
EVALUATION OF SKIN SURFACE TEMPERATURE OF THE UPPER TRAPEZIUS MUSCLE IN WOMEN WITH AND WITHOUT TEMPOROMANDIBULAR DISORDER

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INTRODUCTION

The temporomandibular disorder (TMD) can be defined as a multifactor pathology characterized by a series of signs and symptoms, which affects the structures of the cranio-cervico-mandibular system.1

Studies have shown that individuals with TMD exhibit postural changes, considering the relationship between the cervical region and the temporomandibular joint (TMJ), with great involvement of the upper trapezius.2,4 One of the methods used is infrared thermography, a non-invasive, painless, low cost way that can help identify sources of pain. It also provides comfort and safety for the patient.5

Thus, present study aimed to evaluate the skin surface temperature of the upper trapezius muscle in women with and without TMD.

METHODS

The subjects comprised 16 women, average of 23.75 ± 4.12 years; 8 were diagnosed with TMD (TMDG) and 8 were asymptomatic (GC) according to the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD).

Exclusion criteria were the following: women with BMI higher than 25 Kg/m², in orthodontic and physiotherapeutic treatment, using anti-inflammatory, muscle relaxants or vasoactive drugs. Also excluded were those with systemic disorders and history of facial trauma.

Infrared thermography was used to evaluate the skin surface temperature of upper trapezius muscle. The volunteers remained in a room with temperature around 22°C for a period of 20 minutes prior to data collection. The participants were given instructions to avoid taking hot baths, using topic agents, practicing vigorous exercises and intake stimulants two hours before the recordings.

A thermal camera T360 FLIR® T360 was used, with an emissivity of 0.98. The image was captured at a distance of 100 cm from the volunteer. Styrofoam markers were used due to their insulating characteristics, with the purpose of delimiting the origins and insertions of the evaluated muscle, enabling its further analysis in the infrared image.

To determine the temperature value, the QuickReport software, version 1.1, FLIR Systems® was used. Thus, a point on the average distance was set up between the markers, and the center part of the muscle was established as shown in Figure 1.

Three images of each volunteer were captured and the mean of the values was calculated. The bilateral temperature of the upper trapezius muscle was quantified, as well as the temperature asymmetry obtained through the subtraction of temperature from one side by the other.

The statistical analysis was performed using the Shapiro-Wilk test, followed by the Student’s t test, being considered a significance level of 5%.

The study was approved by the Research Ethics Committee of the Methodist University of Piracicaba, São Paulo, Brazil, under protocol number 15/11.

RESULTS AND DISCUSSION

Comparisons between the TMDG and CG are presented in Table 1. No difference was observed between the groups.

The results of this study did not corroborate the results found in literature. Pogrel et al.3 used the contact thermography and observed temperature asymmetry in the upper trapezius muscle in the TMD group, compared with the control group, which may be due to a possible influence of cervical dysfunction. The authors did not use RDC/TMD for the diagnosis of TMD contrary to the methodology applied in this study. Another investigation4 confirmed the hypothesis of correlation between TMD and cervical dysfunction, suggesting a clinical evaluation for these signs and symptoms. The present study was not intended to evaluate the cervical dysfunction, which may justify the divergence with previous studies.

The fact that no significant differences between the groups were found in this study could be justified by the absence of cervical dysfunction in the volunteers, as reported by the authors.3,4 However, this study did not use instruments for this evaluation.

CONCLUSION

The study showed that there was no change in temperature of the upper trapezius muscle in women with TMD, when compared with those in the control group.

REFERENCES


Table 1 - Comparison between the temperature values of the upper trapezius muscle in women in TMD group (TMDG) and control group (CG). Values showed in mean ± standard deviation. TLUT: Temperature of left upper trapezius; TRUT: Temperature of right upper trapezius; TAUT: Thermal Asymmetry of upper trapezius.

<table>
<thead>
<tr>
<th>Muscle</th>
<th>TMDG</th>
<th>CG</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TLUT (°C)</td>
<td>33.02 ± 1.06</td>
<td>32.80 ± 1.08</td>
<td>0.677</td>
</tr>
<tr>
<td>TRUT (°C)</td>
<td>32.79 ± 1.01</td>
<td>32.60 ± 1.07</td>
<td>0.718</td>
</tr>
<tr>
<td>TAUT (°C)</td>
<td>0.26 ± 0.19</td>
<td>0.23 ± 0.23</td>
<td>0.752</td>
</tr>
</tbody>
</table>

Braz J Oral Sci. 11(2):158-347
EVALUATION OF STANDARD AND ELECTRICAL ACTIVITY THRESHOLD OF PAIN IN THE IMMEDIATE RESPONSE AFTER THE APPLICATION OF THE TECHNIQUE AND DRY NEEDLING ISCHEMIC COMPRESSION: PRELIMINARY STUDY

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INTRODUCTION

Myofascial trigger points (PGM’s) have been recognized by doctors as one of the most common causes of pain and dysfunction in the musculoskeletal system. Clearly, several treatment modalities are considered effective in alleviating the symptoms of PGM’s, but the mechanism underlying such treatments appear to be unknown, so the main objective of this study was to evaluate the immediate effects of pain levels and patterns of electrical activity after the technique of dry needling and ischemic compression technique.

METHODS

The sample consisted of 25 subjects, divided into three groups: Dry Needling (n = 8, age = 23.33 ± 1.21, BMI = 22.80 ± 2.86), ischemia group (n = 7, age = 23.16 ± 1.42, BMI = 22.52 ± 3.28) and Placebo Group (n = 10, age = 22.8 ± 0.97, BMI = 24.23 ± 2.53). We evaluated the electrical activity during rest of the upper trapezius (TS) by means of electromyography and normalized by maximum voluntary contraction (MVC) and the pain threshold through the algometer. We used the Shapiro-Wilk test for normality and evaluation of data. We used ANOVA and Kruskal-Wallis test for variables with normal distribution and non-normal, respectively. The significance level was 5%.

RESULTS AND DISCUSSION

The previous results suggest that there is no difference in resting electromyographic signal of the upper trapezius and pain tolerance among individuals who underwent the technique of dry needling and ischemic compression compared to the placebo group, with p values <0.05.

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre-treatment</th>
<th>Post-treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>GI</td>
<td>n 7, Mean 18.4, SD 31.45</td>
<td>n 7, Mean 6.7, SD 6.51</td>
</tr>
<tr>
<td>GDN</td>
<td>n 8, Mean 9.7, SD 7.76</td>
<td>n 8, Mean 10.0, SD 11.65</td>
</tr>
<tr>
<td>GP</td>
<td>n 10, Mean 3.0, SD 1.79</td>
<td>n 10, Mean 2.3, SD 1.57</td>
</tr>
</tbody>
</table>

Abbreviations: SD, standard deviation, GI, ischemic group, GDN, Dry Needling Group, GP, Placebo Group.

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre-treatment</th>
<th>Post-treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>GI</td>
<td>n 7, Mean 2.8, SD 0.86</td>
<td>n 7, Mean 3.2, SD 1.23</td>
</tr>
<tr>
<td>GDN</td>
<td>n 8, Mean 3.5, SD 1.34</td>
<td>n 8, Mean 4.1, SD 2.46</td>
</tr>
<tr>
<td>GP</td>
<td>n 10, Mean 4.3, SD 1.52</td>
<td>n 10, Mean 4.1, SD 1.75</td>
</tr>
</tbody>
</table>

Abbreviations: SD, standard deviation, GI, ischemic group, GDN, Dry Needling Group, GP, Placebo Group.

CONCLUSION

Based on the results of this study there was no difference in pain threshold and EMG activity patterns between the GDN groups, GI and GP before and after treatment.

REFERENCES:

EVALUATION OF THE BODY BY MEANS OF SYMMETRY PHOTOGRAMMETRY COMPUTED IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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INTRODUCTION

The chronic obstructive pulmonary disease (CPOD) is characterized airflow limitation, leading to acute respiratory failure. Most of these patients have a disorder of the musculoskeletal system, leading to a decrease in muscle mass, such loss in proportional to the physical capacity of the patient. Studies show that is a greater weakness in the lower limbs due to a higher amount of daily activities performed by the upper limbs, but this is not confirmed in the abdominal muscles due to constant muscle activity in cough and forced expiration.

Patients with CPOD may have postural changes, by shortening or overload of respiratory muscles

To analyze the changes of body symmetry in the identification of postural changes in patients with CPOD, this study used the Software for Postural Assessment (SAPO), the photogrammetric analysis.

This work is meant to examine possible changes in body symmetry in patients with COPD, due to adjustments arising from a dysfunction of the musculoskeletal system, which can trigger in a poor posture.

METHODS

The study examined the body symmetry of COPD patients in the period September 2010 to April 2011. We evaluated 11 patients between 52-80 years, diagnosed with CPOD who perform cardiopulmonary rehabilitation treatment in PROMOVE SÃO CAMILO, and willingly participated in the project, which signed a consent form. Inclusion criteria: individuals who have agreed and signed a consent form, being diagnosed with CPOD, performing treatment in PROMOVE SÃO CAMILO, aged between 40 and 80 years. Exclusion criteria: Patients undergoing surgical procedures in the last 12 months, neurological impairment, Oxygen (O2) dependent. Individuals who have not signed the consent form were exempt from the search.

The camera was positioned three meters away from the volunteer and one meter above the ground on a tripod, the plumb line was set parallel to the patient serves as reference for the calibration of the software, the photos were taken in the frontal plane (seen and later) and sagittal (right and left lateral views).

For statistical analysis we used the Test Runs. We consider the significance level of p ≤0.05.

RESULTS AND DISCUSSION

We observed a statistically significant value at a point measured, the angle of protraction of the head in right lateral view. But in the anterior view was observed possible body asymmetries, compared with normal: Acromion left higher than the right, anterior superior iliac spines symmetrical.

In hindsight it was observed abducted scapula (protraction).

The findings of the sample indicate asymmetries measured at all points, but in some, the changes are very close to normal.

The head protraction may be explained by the fact that the lung disease have an altered function of the diaphragm and becomes more accessory muscle use, in order to increase lung volume, the effect would be an increase in thoracic kyphosis and increased protraction of the head.

Because there is a flattening of the ribs, shoulder blades tend to get abducted (protraction).

The acromion is left higher than right acromion, which can be characterized scoliosis.

A decrease of the angle of the ankle, which can be justified due to the flexion collagen in patients. According to Kendall et al (2007), in standing posture angle of the ankle may decrease when the knees are flexed.

CONCLUSION

COPD patients have postural asymmetries such as: protraction of the head, unevenness of the acromial, abducted scapula, trunk extension, hip extension, genu flexion and decreased the angle of the ankle, in order to correct a possible change in the center of gravity.

The paucity of studies published referring to the posture of patients with COPD and low number of patients undergoing research, we can’t generalize such a posture found in the work to all people with this disease.

REFERENCES

INTRODUCTION

Electrodiagnosis of Stimulus (SE) is the interpretation of the motor response of a muscle submitted to specific electric stimuli. It detects the first signs of reinnervation of the muscle (SIQUEIRA, 2007). Its objectives consist on determining the duration of the electric impulse that should be used to stimulate a muscle (innerved or partially denervated) and analyze, in a non invasive, easy and reliable way, the state and evolution of the neural regeneration aster peripheral denervation. Peripheral nerve lesions might result in motor, sensorial and autonomic damages (UMPHRED, 2004), leading to a slow and frequently incomplete process of recovery (CAMARGO et al, 2006). The objective of this paper was to evaluate the neuromuscular response after neurorrhaphy of the ulnar nerve, comparing parameters of the SE on both injured and preserved sides.

METHODS

Nine patients submitted to neurorrhaphy of the ulnar nerve took part in the study. Initially 11 patients were evaluated and two of them were excluded, one due to an ulnar-median nerve lesion and other due to a case of ulnar nerve neuropaxia. Inclusion criteria were: patients with neurotmesis submitted to neurorrhaphy of the ulnar nerve, in medical accomplishment at the UFTM ambulatory, with cognitive ability to understand the consent term and the purpose of the study. Project was approved by the Research Ethics Committee of the UFTM (CEP/UFTM) protocol number 1663. The materials used were: 01 equipment model Nemesys 941 from the brand Quark®; aluminum electrodes size 10x5 cm; vegetal sponges size 10x5cm; 01 Electrodiagnosis pen and evaluation card. In order to perform the SE the patient was advised to sit on a chair with the upper limb comfortably supported on a bed, positioned over a foam roll. The muscle evaluated was the abductor digiti minimi of hand. It was performed a SE bilaterally and the opposite side was considered the control. On the evaluated muscle was positioned the pen electrode (cathode) with moistened gauze, taped to the metal tip. On the opposite limb, the plaque electrode (anode) was taped along with the moistened gauze over the biceps brachii muscle to close the circuit. Current SMS (Strong Muscle Stimulation) was selected to locate the motor point and a gauze over the biceps brachii muscle to close the circuit. Current SMS 

In this study, significant difference was found to the variables chronaxia and alfa (p<0.01 and p<0.03 respectively), with higher values for the chronaxia evaluation on the injured side when compared to the control one. However, there was no difference between sides for rheobase. Higher values of chronaxia and rheobase indicate a process of muscle denervation (LICHT, 1970). Bacarin (2007) when evaluating sensitive chronaxia of neuropathic diabetic patients discovered that in areas of mechanical overload the chronaxia values are higher. Median value was 1,4 for the accommodability coefficient, suggesting cases of partial degeneration and significant difference was found for this variable between injured and preserved side.

RESULTS AND DISCUSSION

General characteristics of the nine patients of the study are presented on Table 2. The accommodability coefficient (alfa) is calculated through the ratio between accommodability and rheobase. Alfa values between 2,7 and 6,0 are considered to be regular, between 1,1 and 2,6 show partial degeneration and below or equal 1,0 are related to total degeneration.

CONCLUSION

The results obtained show a possible relationship between changes in cervical posture and TMD, observed in the angles variations. It is suggested the continuity of this study with a larger sample and analysis of others variables like dental occlusion, static and dynamic postural alignment. These suggestions can clarify the relationship of cause and effect between posture and DTM.

REFERENCES


ACKNOWLEDGMENTS

To FUNEP for the approval at the Young Doctor Edictal n. 935/201.
EVALUATION OF THE TWO THERAPEUTICS PROTOCOL TO TREATMENT OF THE MIOFASCIAL PAIN IN PATIENTS WITH TEMPOROMANDIBULAR DISORDER

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INTRODUCTION

Miofascial pain is a subtype of muscular disorder, classified as a painful condition regional and characterized by local areas of the firm muscular tissue bands and hypersensitive known as “triggers points” of the pain1. The treatment is directed for the elimination or reduction of the causes that can be through therapies caretakers of muscular allonge, thermotherapy and physiotherapy. However this not invasive and reversible method in many cases presents a delay in resulted2. Other efficient method of elimination of a point trigger had been the use of the injection techniques or infiltration3. The aim of this research was the evaluation of the two therapeutics protocol to treatment of the miofascial pain in patients with temporomandibular disorder.

METHODS

Sixty volunteers of both the genders with age among 18 and 70 years had been evaluated by the Service of Orofacial Pain and Temporomandibular disorder (TMD) of the College of Dentistry of the UFMS. The clinical examination has been based on diagnostic index Research Diagnostic Criteria (RDC)4. The patient selected for the study had presented the following signals and symptoms:

Inclusion Criteria

Individuals whose main complaint were pain in the chew muscles; They had presented muscular pain during the functional tests; Interincisal opening maximum was minor who 40 mm; Felt heterotopic pain exactly in rest; Increase of the painful symptomatology with the mandibular function; When provoked, tense bands of muscles with triggers points increase the intensity of heterotopic pain.

After selection of the volunteers in accordance with the inclusion criteria the number of patients evaluated for the study had been 40 patients, however, only feminine gender with age among 21 and 68 years.

The clinic evaluation, diagnostic and revaluation of the patient had been made to 01 researcher. After the selection the patient had been distributed in two groups through drawing carried for researcher 02, whose exactly, made to 01 researcher. The clinic evaluation, diagnostic and revaluation of the patient had been however, only feminine gender with age among 21 and 68 years.

RESULTS AND DISCUSSION

In the studied period had been evaluated 60 patients of the both genders however after the application of the established inclusion criteria to diagnosis of miofascial pain had been selected 40 patients who understood only individuals of the feminine gender with age among 21 and 68 years (Table 1).

The advisements of the patient comprise the reassuring of the same in relation its illness, behavior cognitive orientation for relaxation of the chew muscles and in the care with parafunction habits such as diurnal and sleep bruxism5. The physiotherapy includes exercises and applications of thermotherapy on the chew muscles, deep heat (ultrasound), criotherapy (ice compress, spray frozen) and electrotherapy, acute stimulation, electrodes of stretching, rays infra-red, massages, muscular manipulation and techniques of relaxation6.

Although the success in the case of the not invasive therapies, in many cases of large complexity and chronicity the physiotherapy by itself can not be satisfactory when the physics therapeutic is not efficient or the intensity of pain sufficiently is raised injections in the trigger points can be necessary. Infiltration of the triggers points has shown efficiency in the reduction of pain, in the increase of the limit of movement of the tolerance of exercises and it gain sanguineous circulation of the muscles. In these cases the patient must be informed of the possible collateral effect.

CONCLUSION

In accords with aim of the present research had been concluded that the therapy with anesthetic infiltration was of large effectiveness in the remission of pain reaching improvement of symptomatology in lesser time in patients with miofascial pain.

REFERENCES


Table 1 – Table of the answer of treatment according the complaint of improve of the patient.

<table>
<thead>
<tr>
<th>GROUPS - TREATMENT</th>
<th>TIME OF THE TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Invasive (n=20)</td>
<td>1st Week 2nd Week  3rd Week Final Mean</td>
</tr>
<tr>
<td>0.85</td>
<td>1.2</td>
</tr>
<tr>
<td>Minimum Invasive (n=20)</td>
<td>1.6</td>
</tr>
</tbody>
</table>

Worse = 0; little improve = 1; much improve = 2; without symptoms = 3

Braz J Oral Sci. 11(2):158-347
INTRODUCTION

Individuals with spastic diplegic cerebral palsy (CP) show deterioration of functional gait with advancing age1-2. Through gait analysis and indexes of gait, important data is provided for understanding the patterns of demambulation of patients 3. Thus, there is a need to investigate the influences of aging on the gait providing important data for clinical practice, in addition to allowing deficits secondary prevention based on these changes that develop throughout life.

METHODS

An observational study was conducted cross-sectional methodological design, approved by the local ethics committee. From a list of the Department of Medical Records and Statistical of Lar Escola São Francisco (LESF) 318 medical charts were analyzed: 161 diagnosed with PC, of these 33 were spastic diplegic, over 18 years and levels I, II and III the GMFCS-E & R, however only 11 patients agreed to participate in the study. The gait analysis data were collected at the Laboratory of Movement Studies (LEMES) consisting of 10 cameras Vicon® MX40 using the format plug-in-Gait® to extract three-dimensional kinematic measurements. The gait deviation index (GDI) was calculated using a mathematical routine, and available as described by Schwartz and Rozumalski 4.

For statistical analysis we used the Student t test. The probability (p) less than 0.05 was considered to indicate statistical significance.

RESULTS AND DISCUSSION

We observed significant changes in linear kinematic parameters (Table 1).

Table 2 – Gait Deviation Index (GDI)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Diplegic Group</th>
<th>Reference values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>56.5***</td>
<td>52.6***</td>
</tr>
</tbody>
</table>

The GDI showed the following values (Table 2):

The main angular deviations were: limited ankle plantar flexion in pre-swing, excessive external progression angle of the feet (Table 3); deficit in knee extension support (Table 4), hip extension deficit (Table 5).

Table 3 - Kinematics of the ankle angle (sagittal plane) and the foot progression angle.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Diplegic Group</th>
<th>Reference values</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDP (°)</td>
<td>-8.4±3.2***</td>
<td>22.3±6.5</td>
</tr>
<tr>
<td>A GC</td>
<td>5.7±8.4***</td>
<td>-8.6±6.1</td>
</tr>
</tbody>
</table>

Legend: VDP = value in pre-swing; A GC = average during the gait cycle. Significance *** = p ≤ 0.05.

Studies indicate that changes in the ankles may occur because the deformities and / or suffered interventions throughout life 2,5.

Table 4 – Angular kinematics of Knee (sagittal plane)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Diplegic Group</th>
<th>Reference values</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC (°)</td>
<td>22.8±11.5***</td>
<td>-2.0±5.5</td>
</tr>
<tr>
<td>LR (°)</td>
<td>29.5±9.6***</td>
<td>10.0±8.9</td>
</tr>
<tr>
<td>AS (°)</td>
<td>18.8±11.3***</td>
<td>-5.1±5.3</td>
</tr>
</tbody>
</table>

Legend: IC = initial contact; LR= loading response; AS = average support. Significance *** = p ≤ 0.05.

Table 5 – Angular kinematics of hip (sagittal plane)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Diplegic Group</th>
<th>Reference values</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC (°)</td>
<td>45.0±6.0***</td>
<td>29.4±5.0</td>
</tr>
<tr>
<td>MIN V (°)</td>
<td>17.1±7.1***</td>
<td>-14.1±5.7</td>
</tr>
<tr>
<td>MAX V (°)</td>
<td>48.6±6.4***</td>
<td>32.6±4.6</td>
</tr>
<tr>
<td>M GC</td>
<td>31.6±7.2***</td>
<td>11.6±4.5</td>
</tr>
</tbody>
</table>

IC = initial contact, MIN V = minimum value, MAX V = maximum value, M GC = mean gait cycle. Significance *** = p ≤ 0.05.

Some authors show that the increase in knee flexion and hip is a characteristic pattern of gait in crouching often adopted in diparetic and that is associated with joint degeneration and enhances energy consumption13. The decline in walking ability in patients with CP is multifactorial, and that changes in social or physical environment, changes in body mass, muscle strength, range of motion, immobility, a deficit of balance and postural adjustments, among other factors, may contribute for reduction in ambulation and changes in the pattern of movement of the population1-3.

CONCLUSION

Changes were observed in the kinematics and gait deviation index of adults with spastic diplegic cerebral palsy.

REFERENCES

INTRODUCTION

Falls are common events during activities of daily activities, especially for older people. The consequences of falling are potentially harmful, and their occurrence contributes to the prevalence of health problems and decreased quality of life, is considered a major cause of injury and death in the elderly. The ability to walk in an efficient and safely way is important to maintain the independent live and the prevent falls in the older people. Abnormalities in older people gait, generally, are caused by the fear of falling, because this condition limits mobility, reduces the level of independent activity and consequently increases the risk of falls.

Thus, the objective of this study was to analyze the influence of fear of falling on the electromyographic gait variability of elderly.

METHODS

For this study participated 35 volunteers, divided into two groups: young (n = 17), physically active, college students, and the older group (n = 18), with low risk of falls (Berg Balance Scale) and physically active. This study was approved by the local ethics committee.

To collect the electromyographic signal was used an electromyography (Noraxon®) and surface electrodes Ag/AgCl (Meditrace®) were placed in bipolar configuration on the rectus vastus lateralis muscle (VL), biceps femoris (BF), tibialis anterior (TA), lateral gastrocnemius (GL), according to the rules of SENIAM.

The gait test was performed on a treadmill Millennium Super ATL (treadmill,®). Before starting the test the volunteers performed familiarization with walking on the treadmill at preferred speed. After familiarization the test was started in two different conditions: normal walking (I) and march with apprehensive task (II).

RESULTS AND DISCUSSION

Figure 1 shows the p-values for the muscle activation variability of the muscles VL, BF, TA and GL for the group of young and elderly group in the operating conditions evaluated. There were significant differences between groups for the conditions I and II in all muscles (p = 0.000 for all muscles).

In the intra-group comparisons, significant differences were found between the conditions I and II for the BF and GL muscles in the young group (p = 0.035, p = 0.006, respectively) and in the older group (p = 0.043, p = 0.010, respectively).

The present study aimed to analyze the influence of fear of falling on the variability of electromyographic variables during gait older female to understand the effects of task-related overloads during the walking process. The mechanisms that generate muscle activations for the execution of the gait usually involve the central pattern generation and sensory feedback. With the aging process, these functions may deteriorate and be less effective in response to disturbance and restoration of functional gait. The high values of EMG variability during walking is considered an indicator of instability, as reflect motor control disorders, which are resulted of the central and peripheral nervous system deficits.

CONCLUSION

From the results it is concluded that the group of older female have higher variability of the EMG parameters compared to the group of young people for the same condition in all the muscles assessed. In line of this, we suggest that older adults have greater difficulty to control this motion, which possibly predisposes this population to fall.

REFERENCES


ACKNOWLEDGEMENTS

This project was funded by grants from FAPESP, CAPES, CNPq and FUNDUNESP.
INTRODUCTION

Epidemiological data show high prevalence of musculoskeletal symptoms in the upper extremities of computer workers. Particularly static posture of the upper limbs and neck, or the low level of muscle activation associated with sustained periods of low resting can be considered as a risk factor for these workers.

The use of peripheral devices can change the pattern of motor activity, particularly in the upper limb using the mouse. This relationship can be investigated using electromyography (EMG), with emphasis on the gap analysis, consisting of small occurrences of complete muscle relaxation.

Therefore, the aim of this study is to investigate the occurrence of gaps among administrative workers, according to the use of the mouse.

METHODS

Twenty right-handed administrative servers of the Federal University of São Carlos took part in this study. Subjects who performed computer work for at least 4 hours/day, and gave their informed consent, were included in the study.

Surface EMGs were recorded bilaterally during two hours from both trapezius and wrist extensor muscles using a portable device. Active single differential surface electrodes (DE-2.3, Delsys®) with a detection geometry consisting of two parallel (1 mm x 1 cm) silver bars (99.9%) separated by 1 cm were attached to the skin using a adhesive interface (Delsys®). The reference electrode was placed on the sternal notch. The signals were sampled at 1000 Hz and further conditioned by the main amplifier (Myomonitor® IV, Delsys®), which provided a gain of 1000 V/V, bandwidth 20–450 Hz, 16-bit resolution and noise of 1.2 μV (RMS).

All signals were processed using MatLab® software (v. 7.0.1, MathWorks Inc.). They were band-pass filtered using a sixth-order zero-lag Butterworth filter at 20-450 Hz, and were subsequently reduced through RMS calculation (windows with 8ms-duration), normalized by the highest RMS value achieved in three maximal isometric voluntary contraction (MIVC). Activation percentiles were then calculated (10th, 50th and 90th), as well as the number, total and mean duration of gaps. The gap was defined as contraction periods with activation lower than 1% of MIVC and with duration longer than 100 ms.

The data of right and left sides were compared through the Mann-Whitney test, using the SigmaPlot (V.11.0) statistical package.

RESULTS AND DISCUSSION

The results of the gap analysis as well as the percentile analysis are shown in Table 1. The total duration of gaps shows a longer resting period for the muscles on the left side. On the other hand, there were more number of gaps in the right side, indicating greater activation period and a higher occurrence of gaps on the dominant side of the workers. However, due to the high variability of the data, no significant difference were found, indicating the same resting pattern for both sides.

The 50th percentile, which represents the mean load, indicated higher activation of right side muscles, with significant difference on the 50th percentile (p=0.0002). Therefore, it is possible to suggest that although both right and left sides have a similar resting pattern, the right limb muscles have a higher activation when compared to the left muscles, particularly the wrist extensors. This may indicate a risk factor for the upper limb, possibly associated with the performed activity, particularly related to the use of the mouse. Szeto et al. reported increased muscle activation on the right side, for different muscle groups. Although our data is in agreement with the literature, a more detailed analysis of the data, including identification of the different tasks performed by the workers, can provide more conclusive results.

CONCLUSION

The resting pattern of right and left sides among computer workers seems to be similar. However, the side that controls the mouse has higher muscle activation, particularly of the wrist extensors.

REFERENCES


Table 1 - Mean values and standard deviation (SD) of number, total and mean duration of gaps; activation level in the 10th, 50th and 90th percentiles.

<table>
<thead>
<tr>
<th>Muscles</th>
<th>number mean ± SD</th>
<th>P-value</th>
<th>total duration (s) mean ± SD</th>
<th>P-value</th>
<th>mean duration (s) mean ± SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right trapezius</td>
<td>1875.6 ± 2091.4</td>
<td>0.94</td>
<td>688.8 ± 661.6</td>
<td>0.67</td>
<td>0.30 ± 0.2</td>
<td>0.15</td>
</tr>
<tr>
<td>Left trapezius</td>
<td>1996.8 ± 2007.6</td>
<td>0.67</td>
<td>662.0 ± 763.3</td>
<td>0.21</td>
<td>0.5 ± 0.1</td>
<td></td>
</tr>
<tr>
<td>Right wrist extensors</td>
<td>532.8 ± 911.8</td>
<td>0.61</td>
<td>161.9 ± 361.6</td>
<td>0.55</td>
<td>0.13 ± 0.2</td>
<td>0.34</td>
</tr>
<tr>
<td>Left wrist extensors</td>
<td>594.8 ± 1269.5</td>
<td>0.55</td>
<td>138.2 ± 317.5</td>
<td>0.10</td>
<td>0.1 ± 0.1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>10% (%MIVC)</th>
<th>50% (%MIVC)</th>
<th>90% (%MIVC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right trapezius</td>
<td>0.88 ± 0.55</td>
<td>5.48 ± 3.91</td>
</tr>
<tr>
<td>Left trapezius</td>
<td>1.07 ± 0.86</td>
<td>4.99 ± 3.78</td>
</tr>
<tr>
<td>Right wrist extensors</td>
<td>1.86 ± 1.07</td>
<td>7.43 ± 3.40</td>
</tr>
<tr>
<td>Left wrist extensors</td>
<td>1.40 ± 0.83</td>
<td>4.45 ± 2.28</td>
</tr>
</tbody>
</table>

*P-value with α<0.05, Mann-Whitney.
HEAD AND NECK CANCER CAN AFFECT THE EMG ACTIVITY OF MASSETER AND TEMPORALIS MUSCLES?

INTRODUCTION

The Brazilian Society of Cancer wrote on site that head and neck carcinoma is the fifth malign neoplasy most common in the world, with an annual incidence of 780,000 cases (sbcancer, 2012). A mean of 13,470 new cases of mouth cancer for 100,000 habitants in Brazil is an important incidence to be necessary new researches on patients who has this disease, improving the treatment and reabilitation to head and neck cancer. The relationship between cancer and malnutrition is well established due to the great complexity of the neuromuscular control of oropharyngeal and esophageal suffering interference by the disease (Jotz et al., 2003). These interferences can generate characteristic clinical signs such as anorexia, as the patient loses the ability to differentiate between sweet and bitter tastes, tissue loss, muscle atrophy, myopathy, rapid loss of adipose tissue. As we mention biochemical anemia, hypoalbuminemia, hypoglycemia, lactacidemia, hyperlipidemia. Thus it is clear that malnutrition in cancer patients is associated with increased morbidity and postoperative mortality and lower tolerance to chemotherapy and radiotherapy procedure (Parise et al., 2008). The aim of this clinical study was to evaluate the electrical activity of masseter and temporal muscles of patients with head and neck cancer before start treatment (G1) and compare this data with those person that had never had this disease (G2).

METHODS

The experimental group consisted of 10 patients (mean age 45 years) with head and neck cancer diagnostic on first evaluation and with no treatment applied yet (G1). The control group consisted of 10 subjects paired with experimental group according to age, gender and oral situation (G2). The electromyographic (sEMG) activity of masseter and temporalis muscles was carried out at situations: rest, protrusion, right and left laterality, opening and closing mouth, parafilm clenching and chewing. Inter-group comparisons were made using independent sample t-test. Significance level was set at P<0.05.

RESULTS AND DISCUSSION

There are statistic differences between groups in all postural activities tested (rest: G1= 0.12; G2 = 0.37 [sig. = 0.13], protrusion: G1 = 0.16; G2 = 0.39 [sig. = 0.14], right laterality: G1 = 0.15; G2 = 0.42 [sig. = 0.006], left laterality: G1 = 0.14; G2 = 0.36 [sig. = 0.22]). On dynamic situations evaluated like opening and closing mouth, parafilm chewing and clenching was not verified statistic differences comparing groups. The presence of cancer lesions in head and neck caused a hypoactivity of the masseter and temporalis muscles during rest position and maintaining posture when compared with a group of people who were not affected by the disease. This reduction in muscle activity during maintenance of posture may have originated as a result of deterioration of neuromuscular and sensory mechanisms of head and neck (Cordo et al., 1996) which is one of the deleterious effects of cancer in the region now occupied by the cancerous lesion. Other studies are being conducted in patients undergoing treatment to check for interference of treatments for head and neck cancer in the activity of the masseter and temporal largely responsible for chewing.

CONCLUSION

The presence of head and neck cancer caused a hipoactivity of masseter and temporalis muscles during maintenance of postural position when compared to health individuals.

REFERENCES


ACKNOWLEDGMENT

FAPESP (2010/10472-9).

Figure 1: EMG activity (RMS averages) of the right masseter (RM) and left (LM) and right temporal (RT) and left (LT) measured during: Rest, Protrusion, right and left lateral, opening and closing the mouth, clenching of parafilm, mastigation of parafilm measured on head and neck cancer patients and control group.
INTRODUCTION

The hyoid bone is one of the bones of the human body that does not articulate to another bone. It is located in the neck and allows the insertion of fascias, ligaments and muscles from the tongue, pharynx, scapula and sternum. These structures are responsible for the position of hyoid bone.

The purpose of this study is to assess whether there is relationship between electromyographic activity of the suprahyoid muscles (muscles that sit above the hyoid) and infrahyoid muscles (the muscles that sit below the hyoid) with the placement of the hyoid bone. It is well known that the lower position of the hyoid bone can predispose the upper airway obstruction and cause obstructive sleep apnea-hypopnea syndrome (1).

METHODS

Sixteen young adult males with an average body mass index of 24.37, skeletal class I occlusion and bilateral molar support were evaluated. All volunteers were between the ages of 18 and 35 years. Subjects with hearing, respiratory, visual, swallowing and temporomandibular disorders were excluded from the study - to identify the presence of temporomandibular disorders were used the Research Diagnostic Criteria (2).

For each volunteer was performed a lateral cephalometric radiograph in accordance with the Protocol suggested by Siersbaek-Nielsen & Solow (3). For each volunteer was performed a lateral cephalometric radiograph in situ: the electromyographic records of the suprahyoid and infrahyoid muscles sides of the laryngeal prominence.

For the infrahyoid muscles the electrodes were placed 1cm lateral to both 1cm lateral to the lowest point on the midline of the mandible. For the suprahyoid muscles the electrodes were placed 3cm backward and 3cm backward and laterally to 2cm inter-electrode distance. The reference electrode (ground) was positioned in the skin over the manubrium of sternum. These structures are responsible for the position of hyoid bone.

The electromyographic signals were recorded using ADS1200 Lynx equipment with 12 channels, a gain of 20, a sampling frequency of 2,000 Hz and a band-pass filter of 20-1000 Hz and an analog-to-digital converter (PCI A/D) with 16-bit resolution.

The analyses were performed using the analysis of variance (ANOVA). For the election of the distribution type of the data to be analyzed (Gaussian or lognormal) it was deemed the Akaike Information Criterion (AIC) with the lowest value.

RESULTS AND DISCUSSION

The results indicate that at rest situation and when placing the apex of tongue on the soft palate, there was increased activity of the suprahyoid and infrahyoid muscles in the Group S, however there were not statistically significant differences.

During protrusion there has been increased activity of the suprahyoid muscles p=0.0314 with another one who has the hyoid located lower (B:15.13mm). The analyses were performed using the analysis of variance (ANOVA). For the election of the distribution type of the data to be analyzed (Gaussian or lognormal) it was deemed the Akaike Information Criterion (AIC) with the lowest value.

It was considered the value of p < 0.05 as indicator of statistically significant differences between both groups studied for each movement.

CONCLUSION

The subjects who have the hyoid bone in upper position have increased activity of suprahyoid muscles during the protrusion movement.

REFERENCES

INFLUENCE OF HEAT ON FATIGUE AND ELECTROMYOGRAPHIC ACTIVITY OF THE BICEPS BRACHII MUSCLE

INTRODUCTION
Microwave diathermy is indicated prior to kinesiotherapy techniques. The aim is to increase blood flow, remove byproducts of the inflammatory process and improve the range of motion of joints by diminishing stiffness, increasing the extensibility of collagen fibers and enhancing the elasticity of soft tissues. However, despite its widespread use in the physiotherapy setting, there is a lack of scientific studies that prove evaluate the effectiveness of diathermy, the neuro-physiological characteristics of which, such as intravascular vasodilatation, are difficult to measure. The aim of the present study was to analyze the influence of microwave diathermy over the strength of the flexor muscles of the elbow and fatigue in the biceps brachii muscle through electromyography in the frequency domain.

METHODS
In the present study, 30 volunteers between 18 and 30 years of age were submitted to an exertion one minute of maximal voluntary isometric contraction. The electromyographic signal of the biceps brachii muscle and the strength of the flexor muscles of the elbow were determined before and after the administration of microwave diathermy.

RESULTS AND DISCUSSION
The results demonstrate that the strength of the elbow flexor muscles diminished significantly following the application of heat (p<0.05). Heat also led to a significant reduction in the electrical activity of the muscle studied. Madigan and Pidcoe (2001), investigated the influence of temperature on muscle fatigue of the flexor group of the elbow through electromyography, demonstrating that a change in the temperature of the muscle has a direct effect on the fatigue process.

Besides this, several other authors have obtained similar results as Hunter et al (2003) and Seghers & Spaepen (2004).

CONCLUSION
Based on the findings of the present study, heat administered through microwave diathermy had an inhibitory effect on muscle fatigue. However, microwave diathermy on the biceps brachii led to a significant reduction in the strength of the elbow flexor muscle group, thereby suggesting that heat should not be used prior to any muscle activity that requires a strength yield.

REFERENCES
INFLUENCE OF MASSOTHERAPY ON THE STATIC BALANCE IN SUBJECTS WITH TMD

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2Physicaltherapy Department, Nove de Julho University – UNINOVE
E-mail: yayahage@hotmail.com

INTRODUCTION

The physicaltherapy resources used on Temporomandibular Joint Disfunction (TMD) are based on specific techniques such as manipulation, therapeutic massage, applied electrotherapy, and others (BIASOTTO-GONZALEZ, 2005. p.124).

Massage may contribute for a general improvement of the TMD symptoms, once it reduces the pain perception, promotes relaxation, improving the blood and endogen opioids circulation (CAPELLINI et al., 2006. p.56).

Understanding that an unbalanced body segment may trigger alterations on distal body segments, leading to changes on the Center of pressure (COP) (REIS e BÉRZIN, 2008. p. 379) and that for Bracco et al. (2004), the alteration of the masticatory muscles, neck and occlusal characteristics are correlated as causal factors for the unbalance of the postural chain, influencing on COP. The purpose of this study was to verify if the massotherapy on facial muscles alters COP in subjects with TMD.

METHODS

This randomized, double blind, clinical Trial was performed at the biodinamics of human movement laboratoty at the Nove de Julho University, aproved on the EPC (n°457625). The sample was composed by subjects from both gender, aged 18 to 50 years old, with complete dentition (except third molar) and with TMD, diagnosed by RDC/TMD.

Were excluded from the trial subjects who presented open or cross bite, prognathism or retrognathia, dental prosthesis, orthodontic treatment, neurologic disturbance, making use of orthopedic insoles.

Was employed the force platform system BIOMEC 400 v1.1 (EMG System do Brazil®), with 4 load cels and sampling frequence of 100Hz. The analogic data was amplified and converted to digital and, visualized by the Biomec software (EMG System do Brazil®).

The subjects were placed on relaxed standing position above the platform, with non restrit base. A target was placed 2 meters and adjusted towards the glabela. The collet were performed in two situations: eyes open (EO) and eyes closed (EC). Performing two collections of 75 second for each situation, before and after the performance of 20 minutes massage on the anterior temporalis and masseter, according to Biasotto-Gonzalez protocol (2005).

To the data comparison the tow way repeated measures ANOVA was used (pré collection x post; before and after the massotherapy treatment), the significance level accepted was p<0.05.

RESULTS AND DISCUSSION

The mean values from the oscillation area of COP and the médio-lateral(ML) and antero-posterior(AP) velocity are described at Fig 1. The comparison between the obtained values before (pre and post) and after (pre and post) 10 massotherapy treatment sessions, considering both conditions EO and EC, did not presented significant difference for the variables area (F=1,52; p=0,23) and velocity of COP oscillation on the directions: ML (F=1,31; p=0,27) e AP (F=0,05; p=0,82). These results demonstrated that massotherapy did not influenced COP after 10 treatment sessions.

The trigeminal system transmits big parto of the facial sensory information, teeth, oral mucosa and dura-mater and their motor fibers innervate the responsible muscles of mastication. Connections between the trigeminal system and the vestibular nucleus sugest that information derived by the face also alterate the vestibular system (REIS e BERZIN, 2008).

Based on this information and by understanding that changes on the tonic-postural system do not depend exclusively on the inner ear, but also the external and external sensitive receptors (SHUMWAY-COOK and WOOLLACOT, 2003) were the instabilities provoked on the postural control may be segment or joint, which may have ascendant, descendant or mixed causes. Authors such as Bracco et al. (2004) indicate that the stomatognatic system and its disfuncions are related to the postural control, working as a regulatinf or disturbing instrument. However, for authors such as FERRARIO et al. (1996) e MICHELOTTI et al. (2007) the existency of this relationship is until the present moment contradictory and inconclusive.

REFERENCES

INTRODUCTION

Osteoarthritis (OA) is a chronic joint disease, degenerative multifactorial which leads to individual functional disability. The cause is unknown, but it is believed that OA is developed due to intrinsic changes of tissue due to several factors as genetic, hormonal, bone, mechanical and metabolic. The treatment based on strengthening and stretching designed to improve range of motion, stability and joint biomechanics, promoting pain relief and functional improvement accordingly. The aim of this study was to compare the WOMAC questionnaire of the pre and post-treatment using a protocol for muscle strengthening and stretching for lower limbs in individuals with knee OA.

METHODS

Sixteen volunteers were analyzed (age: 66 ± 7 years, BMI: 32.4 ± 7.2 kg/cm2) with a diagnosis of knee OA over 2 years, unilateral or bilateral, confirmed by radiographic changes. The volunteers underwent a treatment protocol performed three times per week for 8 consecutive weeks, totaling 24 sessions of 60 minutes each. Patients underwent bilateral strengthening exercises (40 minutes) and stretching (20 minutes) of the lower limbs (muscles crossing the hip joint, knee and ankle) with a total duration of 60 minutes. The load used to strengthen was between 15 and 20 repetitions for each muscle group. Weekly the overload was adjusted according to the evolution of muscle strength, by a maximum repetitions test. For the stretching protocol 3 sets of 30 seconds with 15 seconds was applied and maximum amplitude was reached for each exercise. The WOMAC questionnaire was applied before and after the treatment process and a paired Student t test was used to investigate the differences between the indexes using an α of 0.01.

RESULTS AND DISCUSSION

There were significant differences for all domains analyzed: pain (p = 0.00014), stiffness (p = 0.00015) and function (p = 0.00015).

REFERENCE

Muscle weakness provides an increased risk of falls, pain and functional decline, such as greater difficulty in performing functional activities, particularly those involving mobility and transfers when compared to healthy subjects. The decrease in muscle strength reduces the stability of the involved joint thus resulting in pain and decreased function. Thus, a treatment based on muscular strength and stretching can improve the stability of the joint, resulting in reduced stress joint zones. Thus, training of neuromuscular functions ensures a more active lifestyle, improving health, wellness, functional capacity and life of people with knee osteoarthritis.

CONCLUSION

The program of strengthening and stretching applied to muscles of the hip, knee and ankle have showed significant benefits in pain, stiffness and function in elderly, sedentary patients with knee OA, when assessed by WOMAC index.
INTRODUCTION

The supra and infrahyoid muscles play their role in a synergic action with the tonic postural muscles, responsible for maintaining the craniocervical posture. Therefore, a change on the craniocervical posture and/or on the spacial position of the hyoid bone may influence the pattern of the electrical activity of the supra and infrahyoid muscles. This is because the muscle action depends on the length-tension relation, determined by the position of its source and insertion in a bone structure.

Objective: to evaluate the influence of the craniocervical posture and hyoid bone position on the supra and infrahyoid muscles activity during swallowing.

METHODS

Sixteen women, from 19 to 35 years old, took part in the study. All of them without myofunctional alterations during chewing and swallowing, evaluated by a speech therapist. The craniocervical posture and the hyoid bone position were evaluated by means of the cephalometric analysis. The volunteers have undergone right lateral radiographic examination of the cranium and cervical column in their habitual orthostatic position. In order to reproduce the natural head position, they kept the gaze of their eyes reflex in the mirror. The angular variables that assess the craniocervical posture were: CVA (flexion/extension head position); CPL (forward head position); CVT/EVT (cervical curve relation); NSL/CVT and NSL/OPT (cranium inclination on the upper and lower cervical column). The spacial position of the hyoid bone was assessed by the linear distance from this point to the mentum (HY/ME), the mandible (HY/ML) and the third cervical vertebra (HY/C3). Electromyographic (EMG) signals were acquired from the supra and infrahyoid muscular groups, during swallowing of 20 ml of water, 20 ml of gelatin and half biscuit (BONO). The data acquisition was carried out with the Miotool 400 equipment (Miotec, Porto Alegre, Brazil), composed by four channels, 14 bits resolution, sampling frequency of 2 KHz. Butterworth filter with cutoff frequency, high-pass of 20Hz and low-pass of 500Hz. Pre-amplified sensors were utilized with differential input connected to a disposable electrodes model Double, bipolar, placed on the supra and infrahyoid region. The Spearman test was used to verify the correlation between the cephalometric and EMG variables.

RESULTS AND DISCUSSION

Recent studies have investigate the behaviour of the supra and infrahyoid muscles in different head positionings, during swallowing. Differently, this study proposed to investigate the influence of the head posture, with the care of, during the radiographic examination, to keep the volunteer in her habitual posture, not correcting it and without any instruction for this, as described by other authors. In the results, regarding the suprahyoid muscles, negative and moderate correlations were observed between the EMG activity of these muscles and the NSL/CVT and NSL/OPT angles during gelatin swallowing. Similar finding suggests that, the greater inclination of the cranium on the cervical column elevates the mandibular symphysis, undergoing the suprahyoid to a biomechanical disadvantage and interfering on its capacity of moving the hyoid bone during swallowing. The cranium hyperextension on the cervical column harm the swallowing action, once it difficult the larynx and pharynx elevation by its relation with the bone hyoid position. Under the same conditions, positive correlation were observed between these angles with the electrical activity of the infrahyoid muscles, indicating the reflex of the antagonist relation between supra and infrahyoid muscles. The more rectified cervical column (greater the CVT/EVT), higher the electrical activity of the suprahyoid muscles during gelatin swallowing. During biscuit (BONO) swallowing, it was correlated a greater distance from the hyoid to the mandibular plane and to the mentum with a lower activity of the suprahyoid muscles. This indicates that a more consistent food swallowing, with the hyoid in a lower position may have disturb the action of the suprahyoid musculature. Still, it was observed in this situation the need of longer muscular activity, probably to compensate the lower effectivity of this contraction. Regarding the infrahyoid muscles, a greater distance between the hyoid bone and the mentum was correlated with a higher activity of these muscles. The craniocervical posture and the hyoid position seem not have influenced the electrical activity of the studied muscles during liquid swallowing.

CONCLUSION

The craniocervical posture and the hyoid bone position influenced the pattern of the supra and infrahyoid muscles during swallowing. The head posterior inclination and the cervical retilfication seem to have contributed, respectively, to the decrease and increase of the suprahyoid muscles. Unlike, there was a higher activity of the infrahyoid muscles by the influence of the cranial inclination on the cervical column. Aditionally, the more consistent food swallowing with a lower hyoid position influenced the EMG activity of the studied muscles, with reduction and increase of this in the supra and infrahyoid muscles, respectively.

REFERENCES


Table 1: Correlation between the craniocervical posture and the hyoid position and the EMG activity of the supra and infrahyoid muscles during swallowing

<table>
<thead>
<tr>
<th></th>
<th>SUPRAHYOID</th>
<th></th>
<th>INFRAHYOID</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Water</td>
<td>Gelatin</td>
<td>Biscuit</td>
</tr>
<tr>
<td>NSL/CVT</td>
<td>0.11</td>
<td>-0.41*</td>
<td>-0.22</td>
</tr>
<tr>
<td>NSL/OPT</td>
<td>0.18</td>
<td>-0.57*</td>
<td>-0.18</td>
</tr>
<tr>
<td>CVT/EVT</td>
<td>-0.11</td>
<td>0.45*</td>
<td>-0.20</td>
</tr>
<tr>
<td>CVA</td>
<td>0.10</td>
<td>0.14</td>
<td>0.13</td>
</tr>
<tr>
<td>CPL</td>
<td>-0.13</td>
<td>-0.10</td>
<td>0.13</td>
</tr>
<tr>
<td>HY/C3</td>
<td>0.10</td>
<td>0.36</td>
<td>0.19</td>
</tr>
<tr>
<td>HY/ML</td>
<td>-0.22</td>
<td>-0.16</td>
<td>-0.38*</td>
</tr>
<tr>
<td>HY/ME</td>
<td>0.11</td>
<td>-0.18</td>
<td>-0.29*</td>
</tr>
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</table>

NSL/OPT; NSL/CVT (Cranium inclination on the upper and lower cervical column); CVT/EVT (cervical curve); CVA (flexion/extension head position); CPL (forward head posture). Spearman correlation test. Significance level: *p<0,05

ACKNOWLEDGMENT

To CAPES (Coordenation of the Superior Level Personal Amendment) for the financial support.
INFLUENCE OF THE PARAPLEGIC BODY CONTROL IN THE SKILLS WITH WHEELCHAIR

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INTRODUCTION

The spinal cord injury (SCI) is a disabling condition and follows from an injury or illness and affects motor function, sensory and autonomic neuropathies, which often leads the individual to a wheel chair (WC), where the trunk control becomes a pre-functional requirement to stabilization and independence (Bjerkefors, 2009). Thus, the objective of this study was to analyze the effects of lumbar segmental stabilization training (LSS) on the trunk balance and abilities with WC in paraplegics.

METHODS

Five subjects (31.2 ± 12.93 years) SCI T6 to L1 without cardiovascular problems, and / or diagnosis of vertigo, visual or hearing impairment and limitation in range of motion of the shoulder with no history of recent surgery on the spine and inability to remain seated on the WC or the floor. The sample was submitted to clinical evaluation of the level of injury and disability, through the application of Neurological Rating Scale of SCI, and the degree of spasticity by Modified Ashworth Scale.

For the analysis of trunk balance, the subjects were positioned with legs crossed and upper body upright (Buda position) on the platform balance (Biomec 400 -EMG System, Brazil) and asked to remain static. The record of the oscillation of the trunk was made in two positions (arms on his knees and arms crossed at chest height) for 30s and each position was analyzed three times with 1 minute rest between them.

The record of the oscillation of the trunk was made in two positions (arms on his knees and arms crossed at chest height) for 30s and each position was analyzed three times with 1 minute rest between them. Then, the sample was submitted to the Wheelchair Skills Test - WST (Kirby, 2005) to assess three levels of difficulty: 1) internal environment, 2) community and 3) advanced, comprising 57 tasks.

Our results show that the LSS training (adapted) improved control of the trunk, through the strengthening of the ML and TA muscles. The reduction of body sway (total displacement) notes efficacy of this treatment in subjects with IC, confirming the study by Hodges and Richardson (1996) which reinforces the importance of these muscles in the controlling agonist / antagonist and trunk stabilization.

For the acquisition of the greater mobility and a productive lifestyle, it becomes essential to the development of skills with WC. For this, the sitting posture and trunk control are important factors that influence the performance of influence the performance of activities of daily living (ADLs). To this end, the lumbar spine must be strong enough to keep the intervertebral anatomic relationships and protect the neural elements while flexible to allow movement (Almeida et al., 2006).

In this study, all participants improved their skills with the WC, for the community level (across the street, overcome obstacles, 13 cm in height, crossing a slopeacross, pass on floor with boulders, holes exceed 15 to 30 cm diameter, up and down the hill), in agreement with the study of Bjerkefors (2009), who noted that training improves the ability to maintain an upright sitting posture in response to external disturbances of balance.

CONCLUSION

The study results show that LSS training improved trunk control and the ability to manual WC, the paraplegics studied.

REFERENCES

INTRODUCTION

The Temporomandibular disorders (TMD) comprises all functional disorders affecting the temporomandibular joints (TMJs), masticatory muscles and associated structures. Pain in muscles and TMJs, limited mouth opening and joint sounds are signs and symptoms of TMD (De Leeuw, 2008).

Massage is one of the oldest therapeutic modalities. However there are no scientific studies that assess different massage techniques effects in TMD. The aim of this trial was to evaluate the effect of intra-oral and extra-oral massage techniques on pain intensity, electromyographic activity, range of mouth opening and TMD severity degree.

METHODS

Participants were 40 women with myogenic TMD (RDC/TMD), mean age of 24.97 ± 4.92 years. The subjects were divided into five groups: G1 (n=10) combined massage (extra-oral and intra-oral techniques); G2 (n=10): intra-oral massage; G3 (n=10): extra-oral massage; G4 (n=5): control group; and G5 (n=5): placebo (extra-oral massage with light pressure).

The massage treatment consisted of ten sessions (1st to 10th days) performed twice a week. The G4 subjects were evaluated in the same period, without receive any treatment.

It was measured: pain intensity using a Visual Analogue Scale (VAS), surface electromyography (EMG), range of mouth opening (RMO), Fonseca’s Questionnaire. The percentage pain relief was calculated in the end of the study, 24-48 hours after last session (11th day), in relation to 1st day, previously treatment. The EMG, RMO and Fonseca’s Questionnaire were applied on 1st, 5th and 11th days.

For EMG record, the conditioned module of signal ADS 1200 (Lynx Electronic Technology Ltd.) with 8 channels and gain adjust from 1 to 16000 times, where a band-pass filter of 20-500 Hz and a sampling frequency of 2000 Hz for each cannels were calibrated.

The EMG signs were obtained during three activities: Mandibular rest position (RP), during 5 seconds; Maximal dental clenching (DC), 5 seconds, 15 seconds; and Non-habitual bilateral chewing (BC). For DC and BC the Parafilm M® was used, and a Takett Piccolo metronome (Wittern GmbH & Co.) calibrated at 60 Hz was used for BC. A pre-amplifier with a twentyfold gain was coupled to bipolar Ag/AgCl electrodes that were attached on muscle belly (masseter, anterior temporal and suprahyoid) after function test, according Cram et al. (1998). The reference electrode was attached to the volunteers’ sternum bone.

The EMG signal processing was performed on software AqDAnalysis 7. To MB collection the average of three chewing cycles, determined by function test, according Cram et al. (1998). The reference electrode was attached to the volunteers’ sternum bone.

The analysis of variance was performed for each measurement, using GLIMMIX procedure (9.2 SAS Institute Inc.), and Student t test was used for multiple comparisons, and 5% (p<0.05) significance level was considered.

RESULTS AND DISCUSSION

According to obtained results, combined massage showed higher percentage pain relief values for all evaluated sites. The control group showed negative percentage pain relief values for all evaluated sites, what indicates increased pain at the end of the study (Table 1). Others studies also found TMD pain intensity relieving after massagetherapy treatment (Walach et al, 2003; De Laat et al, 2003; Biasotto-Gonzalez & Bérzin, 2004; Capellini et al, 2006; Katsoulis & Richter, 2007).

<table>
<thead>
<tr>
<th>Group</th>
<th>Right TMJ (%)</th>
<th>Left TMJ (%)</th>
<th>Right MM (%)</th>
<th>Left MM (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>96.23</td>
<td>98.52</td>
<td>87.08</td>
<td>79.95</td>
</tr>
<tr>
<td>G2</td>
<td>66.58</td>
<td>72.35</td>
<td>61.38</td>
<td>67.86</td>
</tr>
<tr>
<td>G3</td>
<td>43.97</td>
<td>27.08</td>
<td>62.89</td>
<td>51.54</td>
</tr>
<tr>
<td>G4</td>
<td>-61.33</td>
<td>-208.70</td>
<td>-45.79</td>
<td>-103.52</td>
</tr>
<tr>
<td>G5</td>
<td>56.42</td>
<td>69.29</td>
<td>75.42</td>
<td>72.38</td>
</tr>
</tbody>
</table>

No EMG changes were observed along the study, similarly others studies (Capellini et al, 2005; Pereira et al, 2009; Albertin et al, 2010). However, a variation in the motor units recruitment patterns was found between groups (p<0.05). This fact can be explained by pain complexity, whose effects are integrated to multidimensional pain components and do not occur only in motor function, but also in the somatosensory system (Murray & Peck, 2007; Svensson et al, 2001). An initial EMG examination may be suggested in the subjects evaluation for sample standardization. The RMO with combined massage treatment were significantly higher in 11th day than 1st day (p<0.001) and 5th day (p=0.046). Furthermore, combined massage values were statistically higher than intra-oral massage on 11th day (p=0.02) (Figure 1). Similarly, other studies showed increased range of motion after treatment with massagetherapy. (Medicott & Harris, 2006; Field et al, 2007; Katsoulis & Richter, 2008).

The Clinical Index of Fonseca’s Questionnaire values decrease from 11th day as compared to 1st day (p=0.0002) and 5th day (p=0.015) with combined massage, and from 11th day relation to 1st day with intra-oral massage (p=0.012). In addition, a different behavior was observed for G4, since 11th day values were higher than 1st day (p=0.037) (Figure 2). This results indicates that treatment with combined massage and intra-oral massage provides TMD signs and symptoms improvement.

CONCLUSION

Among massage therapy techniques assessed, combined massage provided greater effectiveness on pain relieving and TMD symptoms, as well as increased range of mouth opening.

REFERENCES

INTRODUCTION
The tone of the abdominal muscles may contribute to the pelvic functions. The aim of this study is to verify whether there is a correlation between the strength of the pelvic floor muscles (PFM) and the contractility of the transversus / internal oblique (Tra/IO) muscles of the abdomen using two different methods: surface electromyography (sEMG) and dynamometry by a load cell.

METHODS
Thirty nulliparous women, without urinary complaints, with the mean age of 23.58 (±3.32) years, body mass index of 23.01 (±2.74) and without diastasis at the abdomen rectus. There were two research methods:

Group 1 (G1): 21 women underwent Tra/IO and PFM electromyography;
Group 2 (G2): nine women underwent Tra/IO EMG associated with PFM dynamometry.

The abdomen EMG was performed using two electrodes (disposable 3M®) positioned on the surface of the transversus abdominis / internal oblique muscle. The PFM electromyography was performed with an intravaginal probe (Physio-Med Services®), having the metallic surfaces positioned in contact with the side walls of the vagina. Dynamometry was performed with an intravaginal sensor, composed of a load (charge) cell integrated with the EMG device (EMG System do Brazil®). Three contractions were collected from each muscle group (Tra/IO and PFM) while the volunteer in supine position, with hips and knees flexed and feet flat on the table. The mean of three contractions were selected for analysis, and the Pearson Correlation Test was used as a statistical test.

RESULTS AND DISCUSSION
It has already been demonstrated by means of EMGs that there is a correlation between PFM and Tra/IO, in nulliparous women. Little is known about dynamometry as a means of investigating the strength of the pelvic floor muscle. Although Dumolin et al (2004) state that dynamometry can be effective in assessing the PFM, there were not found any statistically significant results when comparing the groups of this study, possibly due to the small sample size, especially of the group that underwent dynamometry.

CONCLUSION
The present study identified a strong correlation between the contractility of the muscles of the abdomen and of the pelvic floor when the same mode of comparison is used: surface electromyography. However, the comparison between electromyography and dynamometry showed a weak correlation, which may have been influenced by sample size or the difference between the evaluation methods.

REFERENCES

ACKNOWLEDGEMENTS
To FAPEMIG, for scientific support.
IS IT NECESSARY TO NORMALIZE THE ELECTROMYOGRAPHIC DATA OF THE FUNCTIONAL EVALUATION OF THE PELVIC FLOOR MUSCLES?

Botelho SI, Pereira LC, Marques JA, Lanza AH, Alves FK, Adami DBV, Carvalho LC, Bérzin F, Palma P, Riccetto C

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INTRODUCTION

Surface electromyography (sEMG) is a method that is being used to evaluate the pelvic floor muscle (PFM) function, using a vaginal probe. Nevertheless, the vast majority of published studies don’t present details about the detection, analysis and interpretation process of the EMG signs.1 With the increasing use of sEMG in different health professions, some protocols have been developed to ensure the correct interpretation of clinical results, including the normalization process.

According to A Guide for use and interpretation of Kinesiologic Electromyographic Data2, the decision of normalizing or using EMG absolute data is based on the type of descriptions or comparisons to be made. Scientific literature indicates EMG data normalization as a crucial method for comparisons among different subjects, days of measurement, muscles or studies, increasing the reliability of the biological sign interpretation. Since a common reference value would facilitate comparison among studies, efforts have been made to select the best criteria.

Recently, researchers3 have compared normalized versus not normalized (absolute data) clinical data, and, after qualitative analysis, suggested that the absolute data could better represent the clinical findings. The authors report that the transformation of data into “relative” values, which is obtained from normalization, could confuse the real findings, justifying the need for more studies about the credibility of absolute data in clinical trials.

For this purpose, and considering all the factors that could influence an EMG analysis of the PFM, this study compared the absolute and normalized values of the female pelvic floor muscle EMG, in order to verify that such procedures may be comparable.

METHODS

This is a retrospective study, with 165 subjects, with the mean age of 25.31 (±10.89) years, body mass index of 24.63 (±11.70), randomly selected from a worksheet that contained 380 women evaluated by sEMG (EMG System do Brazil)4 with an intravaginal probe (Physio-Med Services®), by an expert researcher.

The EMG assessment protocol consisted of: putting the subjects in supine position, lower limbs flexed with the feet on the stretcher. The intravaginal probe was inserted manually by the researcher, with the aid of KY’s hypoallergenic gel (Johnson’s & Johnson’s®), with the metallic sensors placed on the lateral walls of the vagina. The reference surface electrode was positioned on the right wrist.4

Three maximal voluntary contractions (MVC) of the PFM, five seconds each, were registered. The contraction of the PFM has been previously taught to the volunteer. After each contraction there was a rest period of double the time of the performed contraction, in order to avoid muscle fatigue.4

The mean of the three Root Mean Squares (RMS) was considered for the analysis of absolute data. For the normalization, the first peak value of MVC was used. The mathematical procedure used was carried out dividing the EMG absolute data by peak value and multiplied by 100.

Comparing both mean values (normalized and not normalized), distributed according to data referring to digital palpation (0 to 5 scale), it was observed that the not normalized (absolute data) presented p<0.0001, which corroborates with the Duarte Kroll et al (2010)3 studies. On the other hand, when submitting the normalized data in the same standard statistical procedures, there wasn’t any significance (p=0.48).

According to the results, it is possible to infer that the absolute data present more accurately the clinical findings. However, to prove the reliability these findings, further study is needed.

RESULTS AND DISCUSSION

The EMG absolute data (not normalized) reflect this clinical findings observed by the qualitative analysis of the pelvic floor muscle contractility. This suggests that these data could be used in clinical trials.

REFERENCES

INTRODUCTION

The International Continence Society recommends that the in the functional evaluation of the pelvic floor muscles (PFM), should be classified by visual inspection, digital palpation, electromyography (EMG) and perineometry. Other methods, such as dinamometry, ultrasound and magnetic resonance imaging have been also suggested. Currently, there aren’t standard clinical methods for assessing women’s pelvic floor muscle function. Digital palpation has been used in clinical practice, although, many researchers consider it unreliable, subjective and not sensitive. Many studies have shown satisfactory test-retest reliability using surface EMG and used the EMG to measure the pelvic floor muscle function. The aim of this study was to investigate if digital palpation of the pelvic floor muscles presents a correlation with electromyographic activity.

METHODS

A controlled clinical and observational trial was conducted where 307 Brazilian women with mean age of 23.93 years, including 39 nulliparous, 117 primigravid pregnant, 64 primiparous in post vaginal delivery and 87 primiparous in post cesarean section delivery. The assessment consisted of both digital palpation and surface electromyography. PFM contractility evaluation was conducted, first, by digital palpation. Muscle contractility was graded according to the Modified Oxford Grading Scale (this is a 6-point scale: 0_no contraction, 1_flicker, 2_weak, 3 moderated, 4_good (with lift), and 5_strong).

PFM contractility was also registered using a surface electromyography equipment (EMG System do Brazil®), using a vaginal probe (PhysioMed Services®), which has two opposing metal sensors. The probe was inserted, manually positioned, by the researcher, with the metallic sensors placed laterally in the vagina where a previously conducted pilot study identified this as the most ideal position of the probe in order to gain the highest electromyographic signals. The reference surface electrode was positioned on the right wrist.

The electromyography evaluation protocol consisted of three, maximal, voluntary PFM contractions, recorded by the vaginal probe (channel 1). The contraction of the PFM has been previously taught to the volunteer, requesting her to press the probe in cranial direction and observe its contraction on the computer screen. Each requested contraction, was performed with a rest period of twice the time of the performed contraction, in order to avoid muscle fatigue.

The assessment was performed by one, and the same, highly skilled and experienced professional. For electromyography detection, three contractions of five seconds each were recorded, where an average of three absolute Root Mean Squares (RMS) was considered for analysis and Spearman’s Coefficient, Jonckheere-Terpstra Test, Kruskal-Wallis as well as Dunn Test were used for statistical analysis.

RESULTS AND DISCUSSION

PFM contractility according to both digital palpation and EMG values were matched, grouped and correlated, following the Modified Oxford Grading Scheme for the first and with the electromyographic findings for the latter (Table 1). A strong correlation between digital palpation and EMG was found (p<0.001).

<table>
<thead>
<tr>
<th>Volunteers (n=307)</th>
<th>DP (a) (Scale)</th>
<th>EMG (μV) (b) Median (SD)</th>
<th>P-Value (a)</th>
<th>Correlation between methods (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>19.11 (10.20)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>21.9 (11.33)</td>
<td>2</td>
<td>&lt;0.001*</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>24.77 (10.75)</td>
<td>3</td>
<td>r=0.739</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>34.42 (8.99)</td>
<td>4</td>
<td>p&lt;0.001**</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>49.68 (12.09)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>62.71 (16.32)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(a) Average digital palpation (Oxford Scale) and electromyography (EMG, expressed in microvolt), ratings distributed according to frequency. SD= standard deviation *Kruskal-Wallis and Dunn tests.

(b) Correlation between the methods of pelvic floor contractility evaluation. **Spearman linear correlation test.

This indicates that, both, EMG and digital palpation can be used in everyday practice, both for clinical use and scientific research. Although both have their limitations and requirements for the method to be acceptable. On the other hand, EMG, being objective, though complex, should be indicated for research practice, considering the contribution it can achieve during patients’ assessment and training, though its methods and techniques need to be improved.

The use of EMG needs to follow very careful and strict protocols during the process of detection, analysis and interpretation of the EMG signal. Thus, this study was based on the recommendations of the International Society of Electrophysiology and kinesiology.

CONCLUSION

There was a correlation between muscle contractility values measured by pelvic floor electromyography and digital palpation. Both methods can be use to validate data in research and clinical setting.

REFERENCES

INTRODUCTION

Back pain is a major contributor to disability and the rising costs of health care in society. The sacroiliac joint (ASI) has a close relationship with persistent back pain causes but is poorly described. With ASI lesion, structural and biomechanical changes may occur due to its complex innervation, as likely to arise, depending on the different areas of the joint, other pain referred patterns. Recent studies show that proprioceptive training can improve the rate force development at a maximum voluntary contraction (MVIC), and induce different neural adaptations that specifically affect the recruitment and trigger rates of motor units at the beginning of voluntary contraction. Joint manipulation stimulates sensory receptors around the joint and affects the central nervous system in spinal segmental and cortical levels, and the neurophysiological effects associated are dependent of forces applied during the intervention. The objective of this study was to investigate the effects of joint manipulation in association with sensory motor training on the reduction of lumbosacral pain.

METHODS

The initial sample was composed by 05 sedentary volunteers, 18 and 35 years old, with anterior pelvic tilt and low back pain at least once every 15 years. The project was approved by the Ethics Committee of the UFMVJM (protocol 006/2011). We used a signal biological acquisition module Myotec® brand Model 400®, four analog input channels, one of these channels for the load cell. The signal was captured by differential surface for marking the anterior and posterior iliac spines. Circular green markers were used for the anterior pelvis tilt. The measurement of perceived pain by patients was made by visual analogue scale (VAS). The volunteers were analyzed before the beginning of the protocol (A1) and after the end (A2).

RESULTS AND DISCUSSION

The results of subjective evaluation of pain and photogrammetry are shown in Table 1. In all the volunteers we achieved significant results in the analysis by VAS between A1 and A2. However, in the photogrammetric analysis, the results observed for the average angle of the anterior pelvic tilt were not significant, probably due to the number of subjects studied or the time of protocol used, as significant results have been observed in previous studies with eight-week protocol. Table 1 can also show the data of the muscle electrical activity observed in electromyography. We noticed a significant increase in muscle electrical activity between A1 and A2 only in flexion of biceps femoris, with no increase in the load, suggesting changes in the coordination and probably the activation of fibers of this component without increasing the total force employed in the activity. Paradoxically, for the rectus femoris, we observed a significant increase in the assessed load, no increase in muscle electrical activity, possibly indicating that this component reacts differently from his opponent, causing other kind of activation during the first weeks of protocol and not increased neuromuscular coordination. Since this is a preliminary study, the findings should be treated with caution. Studies with larger number of volunteers are already under development by the research group. However, it is important to notice that the patients showed clinically significant improvement in pain, the initial objective of the study. The aim is to understand how the stabilization of the pelvic segment is processed to minimize these symptoms.

CONCLUSION

The protocol is effective in reducing low back pain in the patients studied, and the mechanisms by which muscle stabilization is processed remain to be confirmed.

REFERENCES


ACKNOWLEDGMENTS

We thank to the Foundation for Research Support of Minas Gerais-FAPEMIG for financial support.

Table 1: Results of initial and final assessments (A1, A2) of photogrammetry, maximum load, perceived pain and electromyography (R: rectus femoris, B: biceps femoris). Differences are indicated (p <0.05).

<table>
<thead>
<tr>
<th>Load Cell (Kgf)</th>
<th>EMG (RMS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Photogrammetry (*)</td>
</tr>
<tr>
<td><strong>A1</strong></td>
<td>13,33±2,9</td>
</tr>
<tr>
<td><strong>A2</strong></td>
<td>14,18±4,2</td>
</tr>
</tbody>
</table>
INTRODUCTION
The numbers of children who are overweight and obese have been growing due to the population’s habit changes which lead to a sedentary lifestyle with fat diet. Obesity as a result of a multifactorial and plurisystemic issue has influences on the musculoskeletal system. The postural alterations are not exclusive of obese patients, however, they appear more frequently due to excess of corporal mass and the increase of regional mechanical needs (1). Studies have shown that postural alterations in obese children and adolescents includes mainly lumbar hyperlordosis, valgus of the knees, genu recurvatum and flat feet. In addition, in both genders, lumbar hyperlordosis is the most frequent alteration (2). There are few studies related to orthopedic issues on obese children than in pre-school children (5 to 6 years old).
The objective of this work was to verify the lumbar lordosis’ angulation in pre-school children comparing the results between boys and girls.

METHODS
We evaluated children from 5 to 6 years old, from both genders who are students from the local schools in Londrina City, Paraná State. The convenience sample had 30 pre-school children divided in two groups called: G1 for girls (15) and G2 for boys (15). The children were classified obese according to the body mass index analysis, using Anthro Plus software, based on the age, the weight and the height. Values of z score greater than or equal to +2 determined obesity (3, 4). The lumbar lordosis angulation was made by computerized photogrammetry, with marks on T12, L3 e L5, using for the image analysis the software ImageJ. The normality of the data was verified using the Shapiro-Wilk test and afterwards according to the normality result was chosen T test and Mann-Whitney test.

RESULTS AND DISCUSSION
The G1 lumbar lordosis angulation mean was 24.62 (±1.70) and the G2 mean was 29.43 (±1.65). There was no significant difference between the groups (p=0.053). The mean score z for G1 was 2.39 (±0.80) and 2.75 (±0.55) for G2. There was no statistic difference between the groups (p=0.089). The results are similar of the Bachiega studies, which is related to the nutritional state and lumbar curvatures angulation. It is evident that the lumbar curvature presents a clear tendency to higher angulations values in the percentiles of the obese and overweight children of the both genders, but being more relevant on the male gender (5).

CONCLUSION
The lumbar lordosis angulation and the z score was lower in the girls. Although the results are not statistically significant, this work shows that boys presents higher tendency to lumbar lordosis. Perhaps there is a relation between obesity level and the lumbar angulation, because the group that presented higher z score values also showed higher lumbar lordosis angulation. Therefore there is a need for more studies with a greater sample.

REFERENCES

ACKNOWLEDGMENTS
Project Financing: Foundation Araucária - PSUS.
INTRODUCTION

Peripheral nerve injuries are common clinical occurrences that cause disability. The low-level laser therapy (LLLT) has been recommended as an effective treatment in peripheral neuropathic regeneration. When applied with a wavelength of 660 nm and energy density of 60 J/cm² LLLT improved neuromuscular recovery, prevented muscle atrophy and activated enzymes of extracellular matrix remodeling in both muscle and peripheral nerve.

Objective

To analyze the effect of LLLT (660 nm 60J/cm²), applied in crushed sciatic nerve, on the activity of matrix metalloproteinases (MMPs) – markers of nerve regeneration – in rats after 7, 15 and 21 days post injury.

METHODS

Seventy Wistar rats were divided into 7 groups: Normal (N); Peripheral nerve injury (L) with simulated LLLT during 7 days (L7d); L submitted to LLLT 660 nm + 60 J/cm² during 7 days (L+L7d); L15d; L+L15d; L21d; e L+L21d. Axonotmesis was performed on the right sciatic nerve. The GaAlAs laser with wavelength 660 nm, energy density 60 J/cm² was applied at two points along the sciatic nerve starting on the first day after injury. The animals were irradiated daily for 10 consecutive days after injury. For the analysis of MMP activity in the nerve the zymography was performed. This technique allowed the identification of gelatinases involved in axonal growth (MMP-2) and in inflammation (MMP-9) processes. It was also supported by FAPESP (scientific initiation fellowship process no. 2010/20291-1). Gigo-Benato D e Mata T are post-doc and scientific initiation fellows from CNPq, respectively.

ACKNOWLEDGEMENTS

This project was supported by FAPESP (process no. 2010/11795-6). Turi A is also supported by FAPESP (initiation fellowship process no. 2010/11795-6). Gigo-Benato D e Mata T are post-doc and scientific initiation fellows from CNPq, respectively.

RESULTS AND DISCUSSION

MMP-2 and MMP-9 were detected in all samples. The activity of active MMP-2 was higher in the L7d, L + L7d, L15d, L + L15d, L + L21d groups compared to N (p<0.05). The L21d groups showed similar values to N (p>0.05). There was a reduction in the activity of the active MMP-9 on L + L15d and L21d groups compared to N (p<0.05). No other difference was observed for the other isoforms (p>0.05). These results showed that LLLT was able to modulate the activity of MMP-9, reducing its levels on 15 days after acute crush. On the other hand, the MMP-2 activity remained increased at day-21 compared to non irradiated nerves. Previous studies had already showed that MMP-2 is important to the axonal growing cone in injured nerves. Together these results bring new and relevant information for neurological rehabilitation, because described the effects of LLLT on the molecular mechanisms involved in the nerve repair process.

CONCLUSION

The LBP alters the activity of MMPs, important for the nerve regeneration process, accelerating the inflammatory process by reducing the activity of MMP-9 in 15 days and stimulating axonal growth in 21 days, by increased MMP-2.

REFERENCES


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INTRODUCTION
This research was conducted to evaluate electromyographically the masseter muscle, four hours before and 48 hours after surgery for rest, forced centric occlusion and maximum mouth opening in patients undergoing extraction of third molars.

METHODS
We selected 10 subjects with third molars mesioangulados rights, class II position B, female, aged between 18 and 25 years. The third molars were extracted from the right side.

RESULTS AND DISCUSSION
Electromyographically the results showed significant differences (p <0.05) in the right masseter muscle at rest, with an increase of 44.07% of the electrical activity between pre-and postoperatively, while in centric occlusion forced a decline in activity of 68, 68%. In the left masseter, both at rest and in forced centric occlusion, there were no statistically significant differences (p> 0.05). At maximum mouth opening was an increase of electrical activity in right and left masseter, between the preoperative and postoperative periods of 119.96% and 93.97%, respectively (p <0.05).

CONCLUSION
Extraction of third molars alter significantly the activity of masseter muscle, contributing to the onset of trismus.

REFERENCES
INTRODUCTION

Bruxism is defined as static or dynamic occlusion of the teeth at times unrelated to the normal functions of chewing or swallowing. It is a phenomenon that occurs preferentially during sleep, unconsciously, manifesting itself as “tightness” or “grinding” teeth. Bruxism can cause an increase in muscle tone and activity, hypertonicity of masticatory muscles (especially the masseter), contractures and muscle spasms. Electromyography (EMG) is a method that records the electrical activity of a muscle, allowing access to physiological processes that encode the production of motion and force generation. Electromyography has been applied to evaluate function/dysfunction of orofacial muscles, focusing on the muscle activity (hyper or hypoactivity) in the mandibular rest position, the coordination of mastication, the clenching and parafunctional activity. Several authors had used the EMG as diagnostic and to monitor therapeutic outcomes in patients with bruxism. The muscles of mastication, especially the temporal and masseter contain numerous receptors responsible for conduct information to the central nervous system that affect posture, especially of the head. Thus, the masticatory system becomes a regulatory element or disturbing component of posture system. An imbalance induced by a masticatory dysfunction, therefore, cannot lead to a compensation system posture, and an imbalance of the system can change the posture of the masticatory system. Due to lack of available studies about relationship of bruxism with body posture and masticatory muscle electrical activity, the aim of this study is to determine if there is a relation between increased electrical activity of masticatory muscles with the sitting and reclining posture of individuals with bruxism.

METHODS

The study is a cross-sectional and was conducted at the Laboratory of Clinical Orthopedics, School of Physiotherapy, Federal University of Jequitinhonha and Mucuri Valleys - UFVJM. The current sample consisted of 10 bruxist women, 18-24 years-old. We used an acquisition module of biological signals brand Myotec® Miotool® model 400 four-channel analog inputs. The signal was captured by differential surface electrodes (SDS500) with fixed distance of 20 mm, arranged in the direction of muscle fibers. The EMG recordings of the superficial part of masseter muscle were collected three times in two positions: sitting and supine. The individual was asked in each position, to perform three maximal voluntary isometric contractions of masseter muscle (MVIC) - Maximum voluntary intercuspation, lasting 7 seconds and rest for 5 minutes. For data analysis we used the average RMS of the MVIC. Analysis was performed by statistical package BioEstat 5.0, with the Shapiro-Wilk test for normality, independent t test and the Pearson correlation coefficient. We assumed p <0.05.

RESULTS AND DISCUSSION

The data obtained (Figure 1) show that, in the supine position, the masseter electrical activity was significantly decreased than when subjects were seated (p=0.0085). Moreover, the correlation coefficient denoted a good correlation between the data (r=0.84), indicating that there is proportionality at the reduction of activity between these two collections. Several authors have analyzed the electrical activity of masseter at rest and in maximum intercuspation, however, all normal subjects were compared with patients with temporomandibular dysfunction (TMD). Most studies show a higher masseter activity in patients with TMD. Other authors, however, ascertained that TMD patients have lower electromyographic activity in the condition of maximum intercuspation in comparison to normal subjects. Some studies claim that the change in position of the head and body may change the occlusal contacts and mandibular closure path changing, so the electrical activity of the masseter. This may explain the results found in this study. We infer that the rest and the rectification of the neck in the supine position may alter the occlusion and the path of closing, providing decreased electrical activity in masseter. However, no studies were found in the literature comparing the masseter electrical activity in subjects with bruxism, in sitting and lying down position.

CONCLUSION

The masseter electrical activity of bruxist women was statistically decreased when in supine position, compared with the sitting position, in the patients studied.

REFERENCES

MASTICATORY ACTIVITY OF CHILDREN WITH CLASS I AND II OCCLUSION – PRELIMINARY RESULTS

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INTRODUCTION

The occlusal disorders can contribute to the dysfunction of the temporomandibular joint through neuromuscular mechanisms, since they cause hyperactivity of the jaw elevator muscles, which may cause displacement of the articular disc, by changing the position of condilar process. In a population of schoolchildren, it was observed that approximately 90% of subjects had malocclusions. Given this high percentage to evaluate and compare the amplitude and heterogeneity of activation and inactivation of the masseter and temporal muscles may be useful to detect a functionally altered chewing. The objective of this study was to analyze the activity of the masseter and temporal muscles in children with malocclusion Class I and II.

METHODS

We evaluated 10 children between seven and 13 years (mean 10.4 ± 2.17 years) of both sexes (five males and five females) and with typical neurodevelopment; of these, seven were classified as Class I and three as class II malocclusion. The myoelectric activity of the masseter and temporal muscles was obtained by means of electromyography Miograph with plate converting analog/digital 14-bit resolution per channel, sampling frequency of 2.000 Hz and filtered with bandpass filter of 10-500 Hz. For normalization were performed three repetitions of isometric activity (maximum voluntary clenching). There were five repetitions of bilateral isotonic mastication (non-habitual), all for 10 seconds and one minute intervals. Mastication was performed at a rate of one per second contraction. These muscle activity were expressed as percent of maximum RMS obtained from three replicates for each isometric muscle activity (Figure 1). We also analyzed the time variation in the inactivation (TVI): time interval between the deactivation of the first and last muscle during the inactive period (PI), time variation in the activation (TVA): time interval between activation of the first and the latter muscle during the active period (PA).

The higher values of TVI and TVA, the lower the synchronicity between the four muscles to initiate an action or finish.

RESULTS AND DISCUSSION

It was observed that the RMS values presented by class II are increased for all muscles, during the active and inactive chewing cycle (Table 1). This result may suggest a higher muscle activity for this group, however, the observed result did not achieve significance. For both groups, the temporalis muscle was more active in relation to masseter.

There was a higher value of the TVA for children with Class II, showing less synchronicity between the muscles at the beginning of muscle contraction, but without statistical significance. In an unilateral chewing gum, 40% of healthy adults were contractions of the four concurrent muscles (separated by less than 50 ms) and differ only 6.25% larger than 100ms between contractions. The values of TVI, children with class I had a lower synchronicity, with statistical significance. These contrasting results were inconclusive. It is assumed that children with malocclusion Class II neuromuscular disorders have higher during the task of mastication.

CONCLUSION

Children with Class II malocclusion compared to Class I tend to have higher muscle activity in masseter and temporal muscles, during the active and inactive of the masticatory cycle. There is need for further studies with larger samples.

REFERENCES


Table 1: Values of RMS during the active period (AP) and inactive (IP) and the time variation in the activation (TVA) and inactivation (TVI) during mastication in children with class I (n = 7) and class II (n = 3).

<table>
<thead>
<tr>
<th></th>
<th>Class I</th>
<th>Class II</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RMSn right masseter AP (%)</strong></td>
<td>61.39 ± 9.61</td>
<td>73.34 ± 26.59</td>
<td>ns</td>
</tr>
<tr>
<td><strong>RMSn left masseter AP (%)</strong></td>
<td>60.60 ± 14.21</td>
<td>75.16 ± 20.44</td>
<td>ns</td>
</tr>
<tr>
<td><strong>RMSn right temporal AP (%)</strong></td>
<td>73.20 ± 14.99</td>
<td>78.20 ± 20.22</td>
<td>ns</td>
</tr>
<tr>
<td><strong>RMSn left temporal AP (%)</strong></td>
<td>80.73 ± 21.33</td>
<td>82.26 ± 16.97</td>
<td>ns</td>
</tr>
<tr>
<td><strong>RMSn right masseter IP (%)</strong></td>
<td>3.13 ± 1.82</td>
<td>3.97 ± 0.90</td>
<td>ns</td>
</tr>
<tr>
<td><strong>RMSn left masseter IP (%)</strong></td>
<td>3.50 ± 1.89</td>
<td>6.02 ± 2.67</td>
<td>ns</td>
</tr>
<tr>
<td><strong>RMSn right temporal IP (%)</strong></td>
<td>4.60 ± 2.44</td>
<td>8.92 ± 7.98</td>
<td>ns</td>
</tr>
<tr>
<td><strong>RMSn left temporal IP (%)</strong></td>
<td>4.51 ± 1.25</td>
<td>7.75 ± 5.62</td>
<td>ns</td>
</tr>
<tr>
<td><strong>TVA (ms)</strong></td>
<td>80.0 ± 50.0</td>
<td>130.0 ± 90.0</td>
<td>ns</td>
</tr>
<tr>
<td><strong>TVI (ms)</strong></td>
<td>50.0 ± 30.0</td>
<td>30.0 ± 10.0</td>
<td>0.04*</td>
</tr>
</tbody>
</table>

Independent t-test: ns = not statistically significant; * statistically significant.
Masticatory and Swallowing Functions in Young Women with Temporomandibular Disorder

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INTRODUCTION

A stomatognathic structural and functional alteration such as temporomandibular disorder (TMD) can be a harmful factor on the alimentaires functions. Injuries on the temporomandibular integrity and on the masticatory and suprahoid muscles' activity can explain the atypical behaviors observed during these functions. Moreover, orofacial myofunctional alterations, experienced by TMD subjects, could also be related to the chronic pain.

OBJECTIVE:

To evaluate the masticatory and swallowing functions in women with and without TMD. The study also aimed to investigate the position of the mandible and the hyoid bone in both groups as they are important structures in the development of these functions.

METHODS

70 women were evaluated by the Research Diagnostic Criteria (RDC/TMD): 34 composed the study group (SG) with TMD and 36 with no signs and symptoms of TMD took part in the control group (CG). Evaluations of the masticatory and swallowing functions were performed according to the Protocol of Orofacial Myofunctional Evaluation with Scores (OMES). Mandible and hyoid bone position variables were measured by cephalometric analysis. Subjects were submitted to a right lateral radiography of the skull and cervical spine in their habitual orthostatic position. In order to reproduce the natural head position, they were instructed to look at their eyes on the mirror. Mandible position was evaluated through ML/NSL angle, which measures the inclination of the mandibular plane in relation to cranial base. Hyoid position was taken by its distance to the mandible, menton, and to the third cervical vertebra. T-test was used to verify differences between groups in relation to cephalometric variables. Cohen’s effect size and Statistical Power were also calculated. Test for differences between population proportions verified percentage differences among groups at the association between TMD presence with the aspects evaluated on alimentaires functions. All tests admitted a statistical significance of 5%.

RESULTS AND DISCUSSION

TMD subjects presented a lower position of the hyoid bone in relation to the mandible (p<0.00). Moreover, TMD subjects showed a significant difference on tongue (p<0.03) and lip (p<0.04) posture during swallowing function. Chronic unilateral chewing pattern was more frequently adopted in the TMD group (p<0.03). A greater distance between hyoid bone and mandible was also observed in a study with children presenting atypical deglutition. Among anatomical alterations related to myofunctional injuries observed during deglutition, it should be pointed the hyoid bone position as it acts like an insertion structure of several muscles involved on this function, mainly the tongue. Additionally, alterations on the oral phase of deglutition in the presence of TMD may be due to the necessity to avoid pain symptoms exacerbation. The fact that the masticatory function follow a unilateral chronic pattern in TMD subjects may be attributed to the pain presence at the articular injury. Moreover it may be due a reflex of the asymmetrical activity between both sides of masticatory muscles.

CONCLUSION

TMD presence determined myofunctional alterations during masticatory and swallowing functions. A greater distance from hyoid bone to the mandible in addition with the presence of painful symptom can justify, partly, the atypical behaviors observed on TMD group. The TMD repercussion on alimentaires functions, in a young age group, justifies the importance of an earlier diagnosis and therapeutic intervention in these individuals.

ACKNOWLEDGMENTS

To CAPES (Coordination of the Superior Level Personal Amendment) for the financial support.

REFERENCES


Table 1 – Variables referring mandible and hyoid bone position in individuals with and without TMD.

<table>
<thead>
<tr>
<th>Variables</th>
<th>TMD (n = 34)</th>
<th>No TMD (n = 36)</th>
<th>Statistical Power %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average ± SD</td>
<td>Average ± SD</td>
<td>p</td>
<td>d</td>
</tr>
<tr>
<td>ML/NSL</td>
<td>32.41 ± 7.02</td>
<td>31.02 ± 5.80</td>
<td>0.37</td>
</tr>
<tr>
<td>Hy/C3</td>
<td>40.29 ± 5.43</td>
<td>42.13 ± 5.51</td>
<td>0.13</td>
</tr>
<tr>
<td>Hy/Me</td>
<td>55.08 ± 10.82</td>
<td>57.86 ± 7.88</td>
<td>0.22</td>
</tr>
<tr>
<td>Hy/ML</td>
<td>16.70 ± 6.01</td>
<td>12.77 ± 5.48</td>
<td>0.00*</td>
</tr>
</tbody>
</table>

SD: standard deviation; *statistical significance: p<0.01 (Student t test), d = Effect size (Cohen’s d).

Table 2 – Orofacial myofunctional evaluation of masticatory and swallowing functions in individuals with and without TMD.

<table>
<thead>
<tr>
<th>NO TMD (n = 34)</th>
<th>TMD (n = 36)</th>
</tr>
</thead>
<tbody>
<tr>
<td>f %</td>
<td>f %</td>
</tr>
<tr>
<td>Lips occlusion</td>
<td>Normal</td>
</tr>
<tr>
<td>on swallowing function</td>
<td>With effort</td>
</tr>
<tr>
<td>Tongue posture</td>
<td>Normal</td>
</tr>
<tr>
<td>on swallowing function</td>
<td>Interposed</td>
</tr>
<tr>
<td>Unilateral</td>
<td>Preferential</td>
</tr>
<tr>
<td>mastication</td>
<td>Chronic</td>
</tr>
</tbody>
</table>

f: frequency; Test for differences between population proportions: *statistical significance: p<0.05.
MAXIMAL MUSCULAR ACTION OF VASTUS MEDIALIS OBLIQUE AND VASTUS LATERALIS IN OPEN AND CLOSED KINETIC CHAIN

INTRODUCTION
The patellar alignment performed by the dynamic stabilizers, is directly related to the balance in muscle activity of the vastus medialis oblique (VMO) and vastus lateralis (VL). The inappropriate position of the patella in the femoral trochlea, produces an abnormal pattern of patellar alignment that may be related to a change in muscle activity of medial and lateral dynamic stabilizers of the patella and predispose the patellofemoral joint to injury. Open Kinetic Chain (OKC) and Closed Kinetic Chain (CKC) exercises have been used in different rehabilitation programs, which seek to find greater efficiency in selective activation of the VMO, however there is still no consensus on the best approach to be used. Parallel discussions on activation of the VMO, studies based on critical threshold of patellofemoral stress, suggest that the exercises for the quadriceps muscle in OKC should occur at specific amplitudes between 90-60-90°, as they produce lower pressure zones due to higher contact area of the patella with the trochlea. For CKC exercises, stress does not reach critical thresholds in specific ranges of 0-40-0° because the force vector generated patellar backpressure is reduced. However, we found few studies that compare the maximum activation of the VMO and VL between OKC and CKC tasks amplitudes in specific proposals and producing less patellofemoral contact stress. The aim of this study was to evaluate the electromyography activity of the VMO and VL during maximal voluntary isometric contraction (MVIC), using specific joint angles of 80° in open kinetic chain (OKC) and 30° in closed kinetic chain (CKC).

METHODS
We conducted a cross-sectional study approved by the ethics committee of the institution. Twelve sedentary, healthy subjects were analyzed with no history of injury or lower extremity surgery. We acquired the electromyography data of the VMO and VL during maximal isometric voluntary contraction in OKC (at 80°) and CKC (at 30°). The root-mean squared was calculated by electromyography data (RMS EMG), then RMS EMG was integrated (IEMG) and ANOVA (2x2) was used to compare tasks and muscles.

RESULTS AND DISCUSSION
During MVIC, the IEMG of the VMO and VL presented significant differences when compared between tasks (OKC and CKC) (p=0.02 and p=0.08, respectively) (figure 1), however, we did not observe significant differences between muscles for each task. The exercise can provide greater EMG activation of the VMO compared to VL, the amplitudes used in controlled OKC and CKC, can serve as an indication for the rehabilitation of Patellofemoral Pain Syndrome, as described in the literature, which generate lower levels of stress and Patellofemoral contact. The present study found no differences between muscles for both tasks but was found a tendency for greater EMG activity of VMO relative to VL in both situations proposed.

CONCLUSION
There were significant differences in IEMG for the VMO and VL between tasks, using MVIC in specific joint angles.

REFERENCES

Figure 1 – Mean and standard deviation of the Integrated EMG (IEMG) of vastus lateralis and vastus medialis oblique during maximal voluntary isometric contraction (MVIC), using open kinetic chain (OKC) and closed kinetic chain (CKC). (*p<0.05).
MORPHOFUNCTIONAL EVALUATION OF THE STERNOCLEIDOMASTOID MUSCLE IN INDIVIDUALS WITH TMD

INTRODUCTION
The sternocleidomastoid muscle (SCM) shown to be important in maintaining the posture of the head (Santander et al., 2000; Kibana et al., 2002) and acts in close coordination with masticatory muscles and may be affected by functional disorders, referring pain to the stomatognathic system (Santander et al., 2000). Thus, an understanding the biomechanical and structural changes that may affect the muscular structures in individuals with TMD shows essential, once an injury to one of these components can become mutually provocative (Santander et al., 2000; Ferrario et al., 2003; Pallegama et al., 2004).

The aim of this study was to evaluate the electromyographic activity (EMG) and the thickness of SCM muscle by means of ultrasonography (US), in adults with and without TMD.

METHODS
The sample consisted of 47 individuals of both genders, with 28 included in the control group (mean age 25.9±4.7 years old) and 19 in the TMD group (25.4±3.8 years old), classified according the Research Diagnostic Criteria (RDC / TMD).

EMG and US (figure 1) were evaluated for the sternocleidomastoid (SCM) at rest and at maximal voluntary contraction (MVC) (dental clenching), bilaterally. EMG data were obtained by Root Mean Square (RMS) and US in millimeters (mm).

Data were obtained by mean of three repetitions and, for each individual, the mean values of left and right sides was used. Data normality was checked by Shapiro-Wilks and the data comparisons by paired and unpaired tests (p ≤ 0.05).

RESULTS AND DISCUSSION
The results showed significant results when compared EMG values between rest (mean 100.6%; Standard Deviation 101.9) and dental clenching (105.6% ± 101.9) for control group, revealing an alteration of muscular activity in response to mandibular MVC movement. Although, when compared both groups no statistical differences were noted for EMG and US at rest and at MVC.

CONCLUSION
It can be concluded that electromyography activity of SCM shows modifications in response to dental clenching, evidencing the influence of stomatognathic structures among cervical musculature.

REFERENCES

ACKNOWLEDGMENTS
The authors gratefully acknowledge the financial support from FAPESP (Foundation for Research Support of São Paulo - Brazil) and to State University of Campinas for contribute to this work.
MULTIMODAL BIOFEEDBACK AND ITS APPLICATION TO SUPPORT TREATMENT OF SLEEP BRUXISM

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INTRODUCTION
The contribution of Biomedical Engineering for health, especially for dentistry is invaluable. The creativity and determination to carry out the research, strengthen the partnership that favors the diagnosis and dental treatment. It is observed in the literature review, how much Bruxism (parafunctional stomatognathic system) affects much of the world population and Brazil. Disorder is defined as involuntary and unconscious jaw movement. It has daytime event and / or night, as clenching, excessive grinding of teeth. According to the American Medical Association of Sleep (2005) the events of the day and during sleep, have clinical and etiological characteristics differences and require different approaches. It is not an isolated phenomenon that has several implications: psychological, emotional, anthropological, social, physical and mental, inserted in a multidisciplinary context. Sleep Bruxism (SB) is a complex component of sleep disorders can be classified as primary or secondary. The generation of nocturnal bruxism is related to periods of sleep, called arousals. By analyzing the architecture of sleep during the episodes, there is an abrupt change in brain activity accompanied by an increase in heart rate and masticatory muscle tone. 8% of the adult population in Brazil suffers from nocturnal bruxism. It is common in childhood, studies show that about 35% to 90% of children with SB develop symptoms in adulthood (Lavigne et al. 2008). Signs and symptoms range from simple tooth wear to systemic involvement.

DEVELOPMENT
Health researchers with several lines of study, believed that the causal factor of the SB was of peripheral origin of malocclusion. However, developments in diagnostic technology, the understanding of it as a system, recorded important physiological phenomenon that happens during or prior to the act of grinding (bruxism). Studies conclude that its etiology is linked to the Central Nervous System (CNS), Autonomic Nervous System (ANS), especially Limbic System (emotional brain), where emotions come accompanied by somatic responses. Stress triggers self-protection mechanisms that cause bruxism. Diagnosis of SB is a careful clinical interview, questionnaire, palpation. Investigations with advanced technology (EMG, EEG, GSR, polysomnography, Biofeedback, Functional Biometrics, Imaging), are imperative for a more accurate diagnosis. Managing treatment is a complex process, it should be monitored by a multidisciplinary team. By knowing the implication of the SNA (automation of habit, unconsciousness of act) is a major challenge to promote a long-term behavioral conditioning, Multimodal Biofeedback (Sa & Smith, 2003) as well as biomechanical (intra-oral appliances with change in mandibular posture), monitored by equipment and recording of physiological events by health professionals. The studies evaluated in the literature review is used more specifically with EMG Biofeedback to Bruxism. The association of EEG to the EMG, may allow a better evaluation of the episodes, as well as being important resource for behavior change related to conditioning if you can create another engraving with new neural circuitry of the brain, since it is known that the mechanisms of memory enrich activation masticatory muscles with each repetition of the events.

METHODS
It is planned for the experiment, the voluntary participation of 20 healthy subjects of both genders aged between 20-60 years. All will be submitted to the questionnaires. Research subjects must be primary sleep bruxist. Exclusion: mouth breathing with sleep apnea, subjects treated with drugs. Ther will be four groups of five subjects: group A, B, C, D controls. All will undergo polysomnography (mainly with the evaluation of EEG and EMG) Functional Biometrics (Initial and Final), monitored for 12 months. 2 groups will do weekly sessions sequences of 8 sessions and repeated sessions in 3 months to 3 months, until 12 months were will complete Multimodal Biofeedback (Electromyography and Electro encephalography). Two groups will be followed up with intra-oral appliances that change posture with mandibular advancement and interocclusal distance. There is the possibility to be projected a software with the collaboration of BIOLAB’s colleagues that enable the patient to work out at home before bedtime. Data will be collected at the Laboratory of Biomedical Engineering, Federal University of Uberlândia and polysomnographic studies will be conducted in partnership with the Sleep Center after approval by the Ethics Committee Research-UFU.

RESULTS AND DISCUSSION
There is a link between autonomic regulation and rhythmic activation of masticatory muscles especially during sleep. The deceleration of the neuro-physiological functions, regularization of cardiac rhythm and breathing can give us a path of self-control baseline that takes an individual to actively change their behavior and can allow that the parasympathetic system prevails in its activity, reducing volume during sleep and adrenaline cortisol released unnecessarily. Schreiber, 2008 cites the neurovegetative dystonia where there is a balance of the ANS and supersedes the action of the sympathetic system highly stressful on the parasympathetic. The stress would be responsible for an increase in central catecholaminergic neurotransmission and that the expression of parafunctional masticatory activity could alleviate aggression in humans, understanding it as a catharsis or an outburst. Kato in 2003 in a polysomnograph noted that prior to the event of contact and dental waste, the CNS is activated and the respiratory rate and heart rate is increased. Finally there is the activation of masticatory muscles and the contact of tooth surfaces (grinding). The literature also relates the SB as a defense and protection against airway obstruction (apnea syndrome and Hypo-Sleep Apnea-OSAH), where there is the mandibular advancement, determined by the ANS to clear the oropharynx. Research shows that there is no cure for the SB, the specific treatment is palliative, with a combination of behavioral therapy, dental and pharmacological, according to patient profile. It is a symptomatic treatment that does not eliminate the cause.

CONCLUSION
Because the CNS is an etiological factor with strong involvement in SB, it is necessary to research the use of EEG with EMG for diagnosis and treatment, and there is the need for time dilation monitoring ten subjects with Multimodal Biofeedback. The importance of this research field is to readily reveal the cause with scientific evidence, that will allow to prevent the sequelae of Bruxism which can begin pathologically, from an early age persisting into adulthood. It is necessary to broaden the discussion to assess the best way of using this technology Biofeedback has been increasingly valued.

REFERENCES

Braz J Oral Sci. 11(2):158-347
INTRODUCTION
Muscle fatigue may compromise balance control and predispose to falls (Helbostad et al., 2007; Parijat, Lockhart, 2008). Moreover, fatigue adversely affects proprioception, movement coordination, and reaction times (Lin et al., 2009), which are considered important components of gait control. The fatigue recovery is an important factor to avoid falls during gait. However, few studies analyzed the effects of the muscular fatigue recovery, mainly on walking. So, the aim of this study is to analyze the effect of the muscle fatigue and the recovery period after fatigue on gait of the young adults.

METHODS
Ten young male adults participated of this study (age - 24.7±2.8 years; weight - 73.2±4.4kg; height - 1.787±1.01m). The participants walked over an 8m pathway, at self-selected speed. Each participant performed three trials: i) before muscle fatigue (MF), ii) after MF, iii) after 5 and 20min of passive recovery time. Electromyography signal was recorded by an biological conditioner (sample rate - 2000Hz) with eight channels (EMG System do Brazil Ltda.). The surface electrodes were placed in the muscles vastus lateralis (VL), vastus medialis (VM), biceps femoralis (BF), lateral (LG) and medial (MG) gastrocnemius and anterior tibialis (AT) of the right limb. The signals acquisition followed the ISEK/SENIAM recommendations. The data were filtered with high pass Butterworth 4th order and band-pass filter 20-5000Hz. Moreover, the acquisition of kinematic gait parameters was accomplished with a three-dimensional optoelectronic system (OPTOTRAK Certus), using a sample rate of 100 samples/s. Kinematic data were filtered with a 5th order low-pass filter with cutoff frequency of 6Hz. The data acquisition systems were electronically synchronized. The following parameters of the central stride of the each trial were analyzed: RMS, peak EMG activity, muscle activation latency (time of onset of muscle activation to the peak), muscular co-activation index, length, width, duration and velocity. The EMG parameters were normalized by peak EMG activity in the central stride for each participant. After each block of the gait task was performed maximum voluntary isometric contractions (MVC) by a Leg Press device coupled of a load cell (EMG System do Brazil Ltda.) with precision of 0.1Kgf.

RESULTS AND DISCUSSION
The ANOVA did not indicate significant difference in the RMS of the muscles analyzed among the periods (p>0.05), and for peak EMG activity indicated only minor value for the VM before muscle fatigue compared to after muscle fatigue (p=0.04). For the muscle activation latency, the statistical analysis indicated lower latency after muscle fatigue for the VL (p<0.05), BF (p<0.03) and MG (p<0.03) compared to before fatigue, and greater latency of MG after 5min of rest in relation to after fatigue (p<0.02) (Table 1). The muscular co-activation index, BF/VL, was lower before muscle fatigue than after muscle fatigue (p<0.05). For spatial-temporal parameters, the statistical analysis showed shorter stride duration after muscle fatigue compared to before fatigue (p<0.02) and 20min (p=0.01). Moreover, muscle strength decreased after muscle fatigue (p<0.008) and remained lower after 5 min of rest (p=0.009). The results indicated that after muscle fatigue, the participants activated more quickly the muscles. This strategy is related to loss of motor control caused by fatigue. Due to less muscle strength after fatigue, the participants tried to anticipate muscle activation, reducing fall risky on gait. The strategy adopted probably reflects the joint instability caused by muscle fatigue, which also caused high muscular co-activation index to stabilize the knee joint during walking (Hortobagyi et al., 2005). Furthermore, the individuals increased the cadence to decrease the task requirement. However, the recovery time of 5min appears to be enough for participants to recovery and use the strategy previous to muscle fatigue.

REFERENCES

Table 1. Mean and standard deviation of the muscle activation latency, muscular co-activation index, spatial-temporal parameters, and MVC before muscle fatigue, after and in the 5 and 20min recovery times.

<table>
<thead>
<tr>
<th>Muscle activation latency (ms)</th>
<th>pre-fatigue</th>
<th>post-fatigue</th>
<th>5 minutes</th>
<th>20 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>VL</td>
<td>0.20±0.06</td>
<td>0.17±0.07</td>
<td>0.18±0.05</td>
<td>0.18±0.06</td>
</tr>
<tr>
<td>BF</td>
<td>0.16±0.05</td>
<td>0.13±0.05</td>
<td>0.15±0.04</td>
<td>0.16±0.06</td>
</tr>
<tr>
<td>LG</td>
<td>0.28±0.13</td>
<td>0.26±0.12</td>
<td>0.24±0.13</td>
<td>0.22±0.12</td>
</tr>
<tr>
<td>AT</td>
<td>0.42±0.10</td>
<td>0.35±0.15</td>
<td>0.39±0.13</td>
<td>0.35±0.16</td>
</tr>
<tr>
<td>MG</td>
<td>0.27±0.10</td>
<td>0.19±0.09</td>
<td>0.26±0.09</td>
<td>0.25±0.09</td>
</tr>
<tr>
<td>VM</td>
<td>0.17±0.06</td>
<td>0.18±0.08</td>
<td>0.17±0.06</td>
<td>0.18±0.05</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Muscular co-activation index</th>
<th>BF/VL</th>
<th>LG/AT</th>
<th>spatial-temporal parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>pre-fatigue</td>
<td>1.07±0.47</td>
<td>1.13±0.33</td>
<td>length(cm)</td>
</tr>
<tr>
<td>post-fatigue</td>
<td>1.63±1.50</td>
<td>1.16±0.44</td>
<td>134.47±9.14</td>
</tr>
<tr>
<td>5 minutes</td>
<td>1.32±0.92</td>
<td>1.24±0.72</td>
<td>133.97±8.99</td>
</tr>
<tr>
<td>20 minutes</td>
<td>1.43±0.88</td>
<td>1.14±0.38</td>
<td>135.12±9.73</td>
</tr>
</tbody>
</table>

| MVC (kgf) | 344.79±100.38 | 299.88±104.48 | 302.90±100.75 | 303.49±111.63 |

CONCLUSION
Young adults modified the pattern of muscle activation after muscle fatigue, increasing joint stability during walking. Besides, the period of 5min is enough for recovery of muscle fatigue to perform the gait again, using similar strategy before fatigue.
MUSCULAR FUNCTION OF PATIENTS USING ALL ON FOUR REHABILITATION

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E-mail: ligiafodonto@gmail.com

INTRODUCTION

Fixed prosthesis supported on four anterior implants (All-on-four) is a treatment option in cases of severe bone loss. Although this technique has proved cosmetic results, there are no scientific data regarding the interference of this type of rehabilitation in the stomatognathic system. Therefore further investigations are required to prove the functional success of this therapy. The aim of this clinical study was to evaluate the muscular function of patients totally rehabilitated with All on four at maintenance of postural position, compared with those having natural dentition.

METHODS

The experimental group consisted of 14 patients (8 men, 6 woman; mean age 60.4 years) using All on four during at least 6 months; the control group consisted of 14 dentate subjects paired with experimental group according to age and gender. The surface electromyographic (sEMG) activity of masseter and temporalis muscles was carried out at rest, protrusion, right and left laterality. The RMS sEMG values were normalized using the RMS value during maximal dental clench. Inter-group comparisons were made using independent sample $t$-test. Significance level was set at $P<0.05$.

RESULTS AND DISCUSSION

A higher EMG activity was found in all on four group during in all evaluated situations, however none between groups difference was statistically significant ($P>0.05$). The graph show the normalized sEMG values in both groups.

CONCLUSION

All on four and dentate patients showed similar postural sEMG values, showing that the All on four treatment can be considered as a good option for oral rehabilitation in edentulous patients.

REFERENCES


Graph: Normalized RMS values of masseter and temporalis muscles in All on four and control group during rest, protrusion, right and left laterality.
Neuromotor Recruitment of the Quadriceps by Electromyographic Biofeedback in Neurological Patients

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2 School of Physiotherapy from José do Rosário Vellano University – UNIFENAS – MG
3 Department of Nursing Federal University of Alfenas – UNIFAL – MG
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Introduction

Electromyographic biofeedback training (EMGBF) is often used for muscle strength supplementation and quadriceps muscle functional training (Lepley; Gribble; Pietrosimone, 2012). However, the effects of EMGBF training are not yet conclusive.

Objective

To verify the EMGBF therapy efficiency for the neuromotor recruitment of the quadriceps muscle during the shifting training from sitting to standing position and in weight bearing of neurological patients in standing position.

Methods

Eighty-eight patients were selected, of both genders, treated at Alzira Vellano University Hospital’s Biofeedback Laboratory – Alfenas, MG. Patients who suffered from central nervous system injury due to bleeding, ischemia, brain tumor and head trauma and who were able to stay in standing position with or without support were included. Patients with spinal cord injury, younger than 16 years and exceeding 86 years and with severe cognitive impairments were excluded. EMG signals were obtained with disposable surface electrodes Ag/AgCl (20 mm diameter and a centre-to-centre distance of 20 mm) connected to a Neuroeducator device (Therapeutic Alliances Inc., OH, USA). The Neuroeducator device was used to provide the EMG signal feedback, for the analysis of the root mean square (RMS) voltage with an integral noise level of less than 0.2 μV, a bandwidth frequency of 10 to 1000 Hz, a common mode rejection greater than 140 dB, and a frequency sampling of 1 kHz. The EMG signal was calibrated in μV and displayed on a colour monitor in the form of a continuous line updated every one-tenth of a second for sweeps of 20-seconds. The electrodes were placed over the rectus femorales (at the midpoint of an imaginary line going from the anterior iliac spine to the superior part of the patella. A reference electrode was placed on the patella. In the pretest the EMG signal was registered in two different types of movement: (SSP1) shifting from sitting to standing position and (SP1) during standing position while on squatting activity. After five weeks (one session per week, 50 min. each) of EMGBF training the post-test was carried out and the highest peak of the EMG signal was recorded (SSP2, SP2). T-test for paired samples was used to analyze variables using the statistical INSTAT software, where the level of significance was set at p < 0.05.

Results and Discussion

The analysis of variables suggests a difference in EMG activity between S-ST1 and S-ST2 as well as between ST1 and ST2 (table 1). De Biase et al. (2011) demonstrated that 20 patients with incomplete spinal cord injury showed increase in EMG activity in the rectus femoris muscle after 4 weeks (4 sessions) of EMGBF training, both in the movement of extending the knee in the sitting position and when shifting from sitting to standing position. Whereas, Yilmaz, et al. (2010) when compared the quadriceps strengthening in two groups of patients with osteoarthritis, where one group carried on a strengthening program using EMGBF (N=20) and another group (N=20) had a strengthening program without EMGBF, they observed that in both groups an increase in the muscular strength of the quadriceps had occurred, without any statistical difference between the groups. However, Akkaya, et al. (2011) when compared the effectiveness of EMGBF training and electrical stimulation therapy for rehabilitation following arthroscopic partial meniscectomy in 45 patients, reported that the EMGBF training group presented greater gain of muscle strength when compared with other groups.

Conclusion

This study showed results which suggested that neurological patients can improve neuromotor recruitment after EMGBF training. Thus we can infer that the addition of EMGBF training helps to speed up the rehabilitation process after central nervous system injury.

Table 1: Analysis of the mean ± standard deviation of the RMS values (microvolts) in the pre-test of the movement from sitting to standing (ST-SD1) and standing (SD1) and post-test respectively (ST-SD2 and SD2). Right refers to the right leg and left to left leg.

<table>
<thead>
<tr>
<th></th>
<th>ST-SD1</th>
<th>SD1</th>
<th>ST-SD2</th>
<th>SD2</th>
<th>p</th>
<th>SD1</th>
<th>SD2</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>RIGHT</td>
<td>43.33±21.98</td>
<td>132.33±7.37</td>
<td>0.0005*</td>
<td>50.49±26.20</td>
<td>152.51±89.13</td>
<td>0.0001*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LEFT</td>
<td>44.40±31.75</td>
<td>115.70±49.09</td>
<td>0.0015*</td>
<td>47.05±24.23</td>
<td>140.73±72.70</td>
<td>0.0001*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < 0.05

References

INTRODUCTION
Shortwave diathermy (SWD) is considered a deep heat modality that can affect the muscle tissue. Despite its wide use in physiotherapeutic clinical practice, it has not been the subject of much study. Therefore, the aim of this study was to analyze the neuromuscular responses of muscle biceps brachii (BB) at 25%, 50%, 75% and 100% of maximal voluntary isometric contraction (MVIC) during the forearm flexion, before and after applying SWD.

METHODS
Forty healthy women were selected and divided into two groups: short wave group (SWG) with 20 women (BMI: 21.85 ± 2.13) and 20 in the control group (CG) (BMI: 22.07 kg/m² ± 1.91, mean age: 24 ± 3.83). On the first day of collection, the volunteers were submitted to a MVIC test of the forearm flexor muscles of the non-dominant upper limb. Data obtained by load cell simultaneously to the electromyographic signal (SEMG) were recorded. MVIC was maintained for 4 seconds, with a 60 second interval between them, and this was carried out six times. Before (pre) and after (post) applying or not SWG, isometric contractions of the forearm flexion at 25%, 50%, 75% and 100% of MVIC were performed by the volunteers, and data obtained by load cell simultaneously to the SEMG were recorded again. This second day of data collection occurred with a 48 minimum interval after the collection of MVIC.

Values (Kgf) corresponding to the percentages of submaximal contractions were calculated based on the MVIC collected on the first day. During the collection of submaximal contractions, subjects were asked to observe the visual feedback generated on the computer screen. This allowed the display of the value of the forearm flexion strength that was being tested, and therefore, the contraction was maintained in the value previously measured. The active electrode was positioned on the belly of the biceps brachii muscle following the SENIAM guideline, and the reference electrode on the acromion. SWG was applied for 20 minutes, output of 180W (± 10%), equivalent to 60% of maximum power in continuous mode, with the electrodes placed on the anterior muscles of the non-dominant arm.

RESULTS AND DISCUSSION

Table 1 – Values of the root mean square (RMS) of the electromyographic signal of the biceps brachii muscle at different contraction levels (25, 50, 75 and 100% of MVIC) in control group (CG) and short wave group (SWG), pre and post applying or not the source energy, expressed by mean ± SD of % MVIC. n=20.

<table>
<thead>
<tr>
<th></th>
<th>25%</th>
<th>50%</th>
<th>75%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG Pre</td>
<td>17.2±6.2</td>
<td>35.9±11.5</td>
<td>56.5±18.3</td>
<td>89.4±30.5</td>
</tr>
<tr>
<td>CG Post</td>
<td>16.1±5.7</td>
<td>39±15</td>
<td>61.9±22.7</td>
<td>85.6±30.4</td>
</tr>
<tr>
<td>SWG Pre</td>
<td>24±12.1</td>
<td>47.8±27.2</td>
<td>71.3±37.6</td>
<td>96.5±45.9</td>
</tr>
<tr>
<td>SWG Post</td>
<td>23±9.6</td>
<td>46.2±24.1</td>
<td>74.4±35.9</td>
<td>89.1±39.3*</td>
</tr>
</tbody>
</table>

*p<0.05 to the respective pre

In this study, a significant increase was observed in skin temperature of the biceps brachii muscle after the application of SWD (preT = 31.2 ± 1.2° C; postT = 39.4 ± 0.8° C) while in CG there was no change in temperature. No changes were verified in RMS and MF in CG. In SWG, after heat application, there was a reduction of BB RMS only at 100% contraction level. There was no change in MF. The study carried out by Mitchell et al. (2008) corroborates the present study, as it also found reduced RMS of the lateral vastus muscle only at 100% of contraction and no changes in the MF of the same muscle at 50-90% of MVIC after the application of pulsed SWD for 20 minutes. It should be reminded that knee extension submaximal contractions were evaluated at 10-90% of MVIC.

Table 2 – Values of median frequency (FM) (Hz) of the electromyographic signal of the biceps brachii muscle at different contraction levels (25, 50, 75 and 100% of MVIC) in control group (CG) and short wave group (SWG), pre and post applying or not the source energy, expressed by mean ± SD of % MVIC. n=20.

<table>
<thead>
<tr>
<th>Biceps Brachii MF (Hz)</th>
<th>25%</th>
<th>50%</th>
<th>75%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG Pre</td>
<td>50.2±7.9</td>
<td>53.4±6.2</td>
<td>53.2±6.7</td>
<td>53.5±6.6</td>
</tr>
<tr>
<td>CG Post</td>
<td>52.7±8.9</td>
<td>56.4±11.2</td>
<td>53.4±8.2</td>
<td>56.2±10.2</td>
</tr>
<tr>
<td>SWG Pre</td>
<td>53.9±9.3</td>
<td>55.7±8.2</td>
<td>56.6±8.5</td>
<td>56.3±8.6</td>
</tr>
<tr>
<td>SWG Post</td>
<td>54.7±10</td>
<td>55.6±8.4</td>
<td>55.3±8.8</td>
<td>54.8±7.7</td>
</tr>
</tbody>
</table>

*p<0.05 to the respective pre

CONCLUSION
Short wave diathermy was not effective in promoting neuromuscular changes in the biceps brachii muscle.

REFERENCES
NORMALIZATION PROCEDURE FOR ELECTROMYOGRAPHIC ANALYSIS OF NON HABITUAL MASTICATION

INTRODUCTION
The temporomandibular disorder (TMD) involves clinical changes related to the masticatory muscles, temporomandibular joint (TMJ) and associated structures. A more complete diagnosis of TMD requires the combination of good knowledge of functional anatomy, clinical data and electromyographic signals.

Several factors can influence and make it difficult to interpret the electromyographic data obtained from different individuals, days and muscles. In this way, the normalization procedure is recommended to allow comparison, minimize variability and improve repeatability of the electromyographic signals.

The purpose of this study was to compare the raw and normalized values of the electromyographic signals of masticatory muscles obtained between women with and without TMD, and analyze whether normalization can have any influence on the interpretation of data.

METHODS
Fourteen women were selected using the Research Diagnostic Criteria for Temporomandibular Disorders – RDC/TMD and divided into two groups: 7 volunteers with TMD (average of 23.6±3.1 years) and 7 (average of 25±5.2 years) asymptomatic (control group).

To collect the electromyographic signal, the EMG1000 (Lynx®) signal acquisition module was used with 16-bit resolution and an input band of ±1 volt, connected to a computer with simple differential surface electrodes (Lynx®). Signals were amplified 1000x, with band-pass filter of 20-1000 Hz and sampling frequency of 2000 Hz.

The electrodes were positioning on the skin in the region of the masseter muscle and the anterior portion of the right and left temporal muscles, after cleaning the skin with alcohol 70%. The reference electrode was placed on the stern manubrium. The EMG signal was acquired during habitual mastication using Parafilm® for 15 s.

The electromyographic signal was processed in the Matlab® 6.5.1 software to calculate the RMS (µV). Data obtained from both groups (control and TMD) were compared, with and without normalization.

For the analysis of isotonic contraction, the RMS values (µV) were obtained in three more stable central cycles. This windowing was determined visually using the Matlab 6.5 software, except for the initial and final masticatory cycles. The value used for data analysis was obtained by the arithmetic mean of the three cycles.

Normalization was carried out using as reference the RMS means of the second complete cycle, the three repetitions performed during contraction, considered the most stable dynamic phase of contraction.

The Shapiro-Wilk test was applied for the statistical analysis, followed by the Mann-Whitney test. The level of statistical significance was set at p<0.05.

RESULTS AND DISCUSSION
The RMS values showed significant difference for all analyzed muscles when the TMD and control groups were compared (Figure 1) however; this difference was not observed when these groups were compared with the normalized data (Figure 2).

The analysis showed that the volunteers with TMD had the RMS significantly reduced for all the analyzed muscles when compared with the control group, which corroborates other studies (Sato e Kawamura; 2005).

The decrease in electromyographic activity during static and dynamic contractions can be justified by the pain-adaptation model proposed by Lund, et al. (1991). These authors suggest that the neural impulses decreased in the muscles acting as agonists in the presence of chronic pain. However, this difference could not be proved with the use of normalized data, which did not corroborate the studies found in the literature. It is known that the normalization procedure is important for the reliability and repeatability of the electromyographic analysis, but this procedure may be opposed to the raw results.

CONCLUSION
The results indicate the difference between normalized and non-normalized data, which could affect the electromyographic analysis. Further studies should be carried out to approach this procedure in different ways and with a larger sample size.

REFERENCES
INTRODUCTION

The temporomandibular disorders (TMD) are recognized as a group of neuromuscular and musculoskeletal conditions involving the temporomandibular joints (TMJ), masticatory muscles and all associated structures (1). The treatment of TMD is usually conservative, and along with pain relief, the goals of the treatment include the reorganization of muscle coordination, improvement of the function, restoring the possibility to chew, swallow and speak, without pain or exacerbate the problem. In this context, the effects of the laser therapy and orofacial myofunctional therapy (OMT) in cases of TMD, has been studied, however there is no study about the association of these therapeutic modalities.

Therefore, the aim of this study was to evaluate the therapeutic efficacy of OMT, modified by the replacement of the conventional strategies for pain relief, by laser therapy, comparatively to OMT and therapy modified associated with laser therapy placebo.

METHODS

The study was approved by the Human Research Ethics Committee of Institution. (Process 2009.1.86.58.4). Sixty patients with TMD, diagnosed according to Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD), were randomly assigned in three treatment groups using the program GraphPad (Graphpad Software, Inc). Fifty patients started the treatment and forty completed the treatment and revaluations after 1 and 3 months of the end of the intervention, therefore these will be considered for analysis as follow: The group T (n=14, mean age =31.14 ± 12.7) perfomed OMT according to a protocol previously tested, starting with conventional strategies for pain relief of the OMT, followed by the orofacial myofunctional exercises. The group therapy modified associated with laser therapy (Tm-L), (n=14, mean age = 37.43 ± 12.7), which the therapy was initiated by the application of Aluminium Gallium Arsenide laser (780 nm) using Twin Laser device (MM OPTICS LTDA, São Carlos, São Paulo), replacing the conventional strategies of pain relief. The laser was applied continuously with a power of 60mW for 40 seconds resulting in the dosage of 60 J/cm², on the range of the mandibular movements, pressure pain threshold, self-tenderness to palpation, severity of signs and symptoms, difficulty to chew and orofacial myofunctional status. For all these variables, the results seem to be arising from what was common to all groups, i.e., the improvements of the function, restoring the possibility to chew, swallow and speak, without pain or exacerbate the problem. Moreover, the subjects learned to control their movements and to avoid to the condition of the TMJs.

CONCLUSION

Based on the observation that all groups showed improvement of symptoms of TMD, the results can be attributed to myofunctional exercises, common to the all.

REFERENCES


ACKNOWLEDGMENTS

This work was supported by Capes.
INTRODUCTION

In the chronic hemiparesis patients we observed changes in the capacity to stay standing on the orthostatic posture. It’s possible to check the existence of change on the sensory capacity and especially on the integration of it in the higher centers. This way the hemiparesis leads to limitations in performing of functional activities like changing positions on the bed, sit and walk that are motor actions of mobility and where is needed also a performance of the postural control system composed by their motor structures and sensory to promote the appropriate bodily organization to the task, allowing a more efficient movement.

This study has the goal to verify in patients with encephalic vascular accident the interference of the type of the standing base distinct vertical postural over the postural control.

METHODS

Twelve patients with chronic hemiparesis were evaluated from the year of the involvement with complete hemiparesis or of crural predominance due to Stroke. The rating of the postural control of the hemiparetic was performed by measuring the total average speed of oscillation (ASO) and total area of oscillation (TAO) of the center of mass of these patients. These variables of the postural control were captured by a force platform of the brand CEFISE® Sports Biotechnology, the square model, with an acquisition frequency of 100 Hz.

The hemiparetic patients were subjected to immovable postural vertical conditions, bipedal and semi-tandem. In each situation, the patients performed three measurements of thirty seconds over the platform on consecutively, immovable.

Initially data were tabulated in Statistical Package for Social Science (SPSS) in its version 18.0, for descriptive and inferential analysis. We established as an independent variable the postural condition. The dependent variables were the indicators of postural control ASO and TAO. Was used a paired test and was adopted a $\alpha \leq 0.05$ as a way to avoid a false-positive error. The research allowed for the Ethics Committee of The Paraíba State University (UEPB), (protocol number 04363.0.133.000-09)

RESULTS AND DISCUSSION

Was observed (Figure 1) that in the semi-tandem posture there were more ASO than when adopted the bipedal posture ($t=6.15$; $p<0.001$). The same way, the TAO presented bigger measurements to the semi-tandem posture ($t=6.61$; $p<0.001$).

The orthostatic postures adopted in the experiments of this study attempt to mimic the developed in the daily by the hemiparetic patients, who has shown difficulties in keeping such the bipedal immovable posture with their feet parallel as the semi-tandem posture, that has standing base mediolateral smaller and resembles the posture taken in the walking.

Based on this scheme this study found that there is a higher speed and sway area of hemiparetic chronic at positions where the medial-lateral stability limits are narrow as in semi-tandem stance. Corroborates this finding, Chen ET al. observed that hemiparetic patients presented difficulties on maintaining balance conduction in both static and dynamic when compared to healthy controllers and other researchers found a greater sway area. The biggest difficulty revealed at the semi-tandem posture is a bad predictor of the ability to develop an efficient and safe walk.

CONCLUSION

The semi-tandem posture ultimately leads to greater difficulties for the maintenance of upright posture compared to the bipedal position due to the reduction of the standing base.

REFERENCES

INTRODUCTION
The positioning of the pelvis and the state of continence has been objects of studies, however, little is known about the relationship between them. The aim of this study is to verify the relation between pelvic posture, lumbar lordosis, diastasis of the rectus abdominal muscle (DRAM) and the pelvic floor muscle (PFM) contractility in young women who are considered healthy from the urogynecological point of view.

METHODS
So far, 11 nulliparous women, without urinary complaints, with the mean age of 21.80 (±2.20) years and with body mass index of 21.10 (±1.36) were evaluated. The contractility of the pelvic floor muscle was investigated by digital palpation (Modified Oxford Grading Scale), pelvic posture, through Photogrammetry and diastasis of the rectus abdominis by pachimetry. For the photographic record the volunteer wore a swimsuit and had the following anatomical points marked: spineous processes of the T12, L3 and L5; anterior superior (ASIS) and posterior-superior iliac spines (PSIS). The photographs were recorded in the frontal and sagittal planes, following the standard procedures described in literature.

The vaginal digital palpation was performed by means of the Modified Oxford Grading Scale (this is a 6-point scale: 0_no contraction, 1_flicker, 2_weak, 3_moderate, 4_good (with lift), and 5_strong).1 The volunteer, in supine position, was instructed to contract the PFM and then repeat the contraction with the examiner’s index and middle fingers introduced into the vagina to determine the PFM contractility. With the volunteer in the same position, DRAM was measured by a caliper in two marked points: 4.5 cm above and below the umbilicus, during the forward flexion of the trunk (abdominal muscle contraction).

RESULTS AND DISCUSSION
From the 11 women who were evaluated, 81.8% presented a PFM contraction score higher than or equal to two, which means that they have the awareness and ability to contract the muscles of the pelvic floor. None of the young people reported DRAM, possibly due to their muscle’s physiological condition. According to the photogrammetric analysis, 99% of the women presented pelvic positioning in anteversion. No changes were detected in lumbar lordosis or any other significant pelvic asymmetries.

Table 1. Angles analyzed by photogrammetry.

<table>
<thead>
<tr>
<th>Angles</th>
<th>Mean±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASIS**</td>
<td>1.63±0.85</td>
</tr>
<tr>
<td>PSIS*</td>
<td>1.85±1.01</td>
</tr>
<tr>
<td>Pelvic weighbridge</td>
<td>2.00±1.71</td>
</tr>
<tr>
<td>Lumbar lordosis</td>
<td>290.24±10.28</td>
</tr>
</tbody>
</table>

*ASIS; Antero Superior Iliac Spine
**PSIS; Postero Superior Iliac Spine
SD; Standard Deviation

CONCLUSION
Lumbar lordosis and the contractility of the muscles of the pelvic floor showed a strong correlation (p<0.001), demonstrating that postural balance can positively influence the contractility of the pelvic floor.

REFERENCES

ACKNOWLEDGEMENTS
To FAPEMIG, for scientific support.
PERCEPTION ANALYSIS OF THE POSITION OF THE FOREARM IN THE FLEXION AND EXTENSION MOVEMENTS OF THE ELBOW

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INTRODUCTION

Proprioception is the perception of the different parts of the body by means of neural information originating in the tendons, muscles, joints and deep tissues. The proprioceptors, which are muscle receptors (muscle spindle and the Golgi tendon organ – GTO) and joints (Ruffini terminations, Pacini corpuscles, Golgi type terminations and free nerve terminations), are used to collect this information. Thus, the objectives of this study are to investigate and compare the proprioception perception in the active movement of the upper dominant and non-dominant limb by means of isotonic concentric and eccentric contractions of the elbow flexor muscles.

METHODS

Twenty (20) healthy subjects (10 male, 10 female), aged 18 to 28 years, from Uberlândia-MG, took part in the experiment at the Unitri Electromyography Laboratory. One of the volunteer’s upper limbs was fastened at predetermined angles (40°, 90° and 135°). The task of the volunteer was to align his movable arm (MA) to the fixed arm (FA). The difference between the MA and FA angle was registered by an electrogoniometer. Over and above the FA position one also assessed the MA (dominant x non-dominant) and the type of movement (concentric x eccentric). Each combination of factors was repeated fifteen (15) times and an average of errors was calculated (positive errors indicate overestimation of the arm position, or in other words, the MA transposed the FA and negative errors indicate underestimation, that is, the MA stopped before the FA). The values obtained were submitted to an ANOVA of 3 factor repeated measurements (MA, angle reference and type of movement).

RESULTS AND DISCUSSION

In the results the values obtained in the concentric movements were superior to the eccentric values with R² 0.9999. Significant effects of the movable arm (p<0.02), type of movement (p<0.01) and an interaction between type of movement and angle of reference (p<0.01) were found. In this way the results suggest that the volunteers: (1) tend to underestimate the arm position in the concentric movement and to overestimate same in the eccentric movement (-6.93°±1.57° vs. 14.03°±1.49°); (2) tend to have greater errors when the FA was the dominant superior limb (4.37°±0.45° vs. 2.73°±0.41°); (3) tend to have less errors when the angle is 40° (7.41°±2.12° for concentric movement and 0.32°±1.89° for eccentric movement), than with angles of 90° (-12.81°±1.84° and 20.00°±1.74°) and 135° (-15.40°±1.49° and 21.79°±1.62°) in both types of movement.

In eccentric contraction the motor planning and muscular activation are distinct from concentric contraction. Moreover, there is less synergistic muscular activity and muscular recruitment can be inverted. Error in alignment also increases according to angle increase, probably due to using less effort to keep the MA more flexed, as the vector action from the force of gravity is less. There is greater activity of all flexor elbow muscles at angles below 90°. Another point is that in the non-dominant upper limb as the MA the errors in alignment are less and it is common knowledge that neural mechanisms to control dominant upper limb and non-dominant upper limb movements are controversial.

CONCLUSION

Proprioception and the adjustment mechanisms are influenced by the type of contraction and movement magnitude, suggesting differences in muscular recruitment.

REFERENCES


ACKNOWLEDGEMENTS

Financial support: CAPES and FAPEMIG.
PHOTOGAMERY AND CEPHALOMETRICS ANALYSIS IN PATIENTS WITH TEMPOROMANDIBULAR DISEASES

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INTRODUCTION
The frequency of the temporomandibular disease in the people is considerable, showing a prevalence of about 25 and 70%, independent of economic class, school level and age, the women generally being more afflicted and more attacks.

Some authors suggest a close relationship between body posture and TMD. Considering that the muscles are an interconnected system, Souchard¹ has affirmed that maintaining the equilibrium is fundamental and the disorganization of a body segment will involve a reorganization of the other segment forming a compensatory posture which will also influence the dependent motor functions. Therefore, there is a close relationship between the changes in head position and mandible posture. Facing diverse results of different evaluations methods about head and cervical spine positions in patients with TMD, the objective of this research is to try to elucidate gaps in the literature, realizing the evaluations of the cervical spine and head positions in patients with and without TMD, by photogrametry and cephalometrics analysis.

METHODS
Participated in this study 20 volunteers of the female gender, divided in two groups: a control group without TMD with a middle age of 22.5 (±0.850) and a group with DTM with a middle age of 24.10 (±2.961). This study received the authorization of the Committee of Ethic and Research, process nº 23/2010. The volunteers were submitted to a TMD questionnaire proposed by Dworkin e Le Resche and evaluated by the same researcher. The Photogrametry was performed using the Software CorporisPro, using a protocol by four different photogra fic views: anterior, and posterior view, right side view and left side view. The measurements were in angles which were abbreviated. The cephalometrics X-RAY was performed in right side view, to analyze the position of the occipital protuberance and its relation to cervical spine and hyoid bone position. With the object of maintaining a blind sample, Rocababado’s cephalometric, were performed by another professional who didn’t have contact with the volunteers.

RESULTS AND DISCUSSION

The postural alteration analysis by photogrametry showed that there was not significant statistical difference between the control and TMD groups, but an increase in some measures were observed disarrangement of the head and clavicular external bone in volunteers of the control group which, could suggest that the postural alteration wouldn’t be related with TMD. The head protrusion (HP) didn’t show a difference in volunteers of the control and TMD groups, so like Ciacaglini et al.², Visscher et al.³ research these differences can be attributed to the different methods used in the studies. In this research were analysed cranio-vertebral angle and O–A distance, described by Rocababado⁴, where he evaluated the head position. The cephalometrics analysis, like in, the photogrametry, showed that there isn’t a significant statistical difference between the control and TMD groups, therefore, there was a higher alteration in the control group’s measures like, O-A distance and cranio-vertebra angle, when compared with the TMD group. The results obtained agree with those of the Iunes⁵ which have no difference between the control and TMD groups. Visscher et al.³ didn’t view difference either in posture between the control and TMD groups. According to Iunes⁵, the presence of cervical retification in volunteers of the control group is increasingly observed in the general population independent of the presence of other musculoskeletal disfunction, suggesting that postural habits could increase the activity of the other vertebral muscles.

CONCLUSION
Through this study it can be concluded that the head and cervical spine postures aren’t directly related to temporomandibular disfunction.

REFERENCES
5. Iunes DH. Análise da Postura Crânio-cervical em pacientes com Disfunção Temporomandibular. 2007. 163 f. Tese (doutorado) – College of Medicine of Ribeirão Preto, University of São Paulo, Ribeirão Preto.

Table 1 - Measures evaluated Average and Standard Deviation of Groups, TMD and Control e p values.

<table>
<thead>
<tr>
<th>Measures evaluated</th>
<th>TMDGroups</th>
<th>Control Groups</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance O – A (mm)</td>
<td>16.81 ± 3.16</td>
<td>16.66 ± 5.18</td>
<td>0.231</td>
</tr>
<tr>
<td>Crânio-Vertebral Angle</td>
<td>103.16 ± 7.50</td>
<td>107.17 ± 10.49</td>
<td>0.231</td>
</tr>
<tr>
<td>Hioyd Triangle (mm)</td>
<td>4.72 ± 4.00</td>
<td>4.05 ± 7.15</td>
<td>0.231</td>
</tr>
<tr>
<td>Cervical Lordosis (cm)</td>
<td>78.37 ± 6.13</td>
<td>76.28 ± 8.73</td>
<td>0.231</td>
</tr>
</tbody>
</table>

p < 0.05there is relation between the variables analysed

Braz J Oral Sci. 11(2):158-347
INTRODUCTION

Temporomandibular Disorder (TMD) is a clinical syndrome that affects mainly the masticatory muscles and temporomandibular joints (TMJ), with recurrent or chronic course and fluctuation of signs and symptoms over time. The genesis of TMD can be caused by postural deviations of the spine, head position, shoulders, pelvis and lower limbs, predisposing the individual with TMD to other musculoskeletal disorders. According to Olivo et al., the TMJ are directly related to the cervical and scapular region through muscular chains, postural changes of the spine could cause TMJ disorders and vice-versa.

In this sense, the relationship between body posture and TMD can guide prevention and rehabilitation processes, and among the resources available is the photogrammetry. Thus, the objective of this study was to evaluate the posture of individuals affected by TMD, through computerized photogrammetry.

METHODS

Eight female subjects (age 37.5 ± 15.8 years, 63.7 ± 16.3kg and 1.6 ± 0.1m height) with a diagnosis of TMD for at least 6 months participated. Initially an anamnesis was performed, and the visual analogic scale (VAS) was applied to quantify the intensity of TMD pain.

Posture was assessed by means of photogrammetry, using the Postural Assessment Software (PAS/SAPO). Anatomical points were marked (spherical markers of 15mm in diameter), attached to the skin, bilaterally: tragus of the ear; 7th cervical vertebra; 12th thoracic vertebra; midpoint of the acromion; anterior superior iliac spine; posterior superior iliac spine; greater trocanter; patellar medial point; tuberosity of the tibia; lateral region through muscular chains, postural changes of the spine could cause TMJ disorders and vice-versa.

Table 1 shows the postural deviations and correlation with pain intensity (r values).

<table>
<thead>
<tr>
<th>Posture</th>
<th>Mean</th>
<th>SD</th>
<th>r</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAH</td>
<td>2.8</td>
<td>3.9</td>
<td>0.93</td>
<td>0.001</td>
</tr>
<tr>
<td>HAA</td>
<td>1.7</td>
<td>1.8</td>
<td>0.28</td>
<td>0.49</td>
</tr>
<tr>
<td>HAHT3</td>
<td>-8.2</td>
<td>20.8</td>
<td>0.41</td>
<td>0.30</td>
</tr>
<tr>
<td>HAHC7</td>
<td>44.0</td>
<td>5.4</td>
<td>0.20</td>
<td>0.60</td>
</tr>
<tr>
<td>VAAH</td>
<td>23.4</td>
<td>12.3</td>
<td>0.28</td>
<td>0.49</td>
</tr>
<tr>
<td>VTA</td>
<td>-1.0</td>
<td>2.4</td>
<td>0.07</td>
<td>0.85</td>
</tr>
</tbody>
</table>

r: correlation with VAS scale; SD: Standard deviation; HAH: Horizontal alignment of the head; HAA: Horizontal acromion alignment; HAHT3: Horizontal scapular asymmetry relative to T3; HAHC7: Horizontal alignment between head/C7; VAAH: Vertical alignment between acromion/head; VTA: Vertical trunk alignment.

Findings of the present study support previous research that investigated the posture of individuals with and without TMD, in which TMD does not only relate to the position of the jaw and skull, but also with the cervical spine, supra and infra-hyoid structures, shoulders and thoracic spine, since such structures function as an integrated biomechanical unit.

According to Gonzales e Manns, the anterior head position is characterized by an extension of the head and the upper cervical spine (C1 to C3), concomitant to a flexion of the lower cervical spine (C4-C7), whereby the curvature of the cervical spine is increased (hyperlordosis). In the present study, the pronounced forward head (HAHC7) also corroborates Nicolakis, who found an accentuation of the dorsal and lumbar curves and pelvic asymmetry in TMD patients. Those findings demonstrate that perhaps a muscle activity resulting from cranio-cervical extension of the head produces an elevation and retraction force, acting on the jaw and can result in a reduction of the physiological TMJ space, culminating with TMD.

The body posture is characterized by muscular chains formed by multi-joint muscles that determine the interdependence of numerous joints. In this case, a segment imbalance could affect another segment, which can be near or far from it. Thus, the disruption of a body segment with fascial and muscular retractions will result in a compensatory posture that also influence dependent motor functions. These aspects may explain the postural deviations and the high levels of pain found in this study.

CONCLUSION

Body posture and pain intensity are altered in subjects suffering from TMD, especially, a pronounced head anteriorization and extension. Also, present findings demonstrated a compensation characterized by a postural correlation between VAS and horizontal deviation of the head.

REFERENCES

INTRODUCTION
Craniofacial morphology and masticatory muscles physiology have been related to each other and to the mastication function1,2,3. Several studies have compared in individuals with different vertical patterns of face growth by ultrasonography (US) measurements and electromyography (EMG) of the masticatory muscles1. However, since dentoalveolar open bite does not involve changes in the pattern of facial growth, studies involving children with this malocclusion are scarce1. In the present study the function of the temporal and masseter muscles was investigated comparatively among children with dentoalveolar anterior open bite, skeletal anterior open bite, and with normal occlusion.

METHODS
Fifty-six children of 6 to 12 years (mean= 8.8±1.2 years) were distributed in three groups, after clinical examination and cephalometric analysis, according to two criteria: (1) the presence of anterior open bite or its absence and (2) the facial skeletal pattern analyzed in the vertical plane using the Jarabak quotient as follows: Group C, 13 children without open bite, with FHR > 59 (Neutral pattern); Group OB, 23 children with open bite and FHR > 59; Group Hyper-OB, 20 children with open bite and FHR < 59 (skeletal).

Surface differential active electrodes (two 10-mm long and 2-mm wide Silver-chloride bars, separated by a distance of 10 mm, with input impedance of 10 GΩ and common-mode rejection ratio of 130 dB at 60 Hz) were used. The skin was cleaned with alcohol. The electrodes were positioned in the belly of both masseter and in the anterior portion of the left and right temporal muscles. The position of the electrodes was determined by palpation, and they were fixated with adhesive bandage tape, with the longest extension of the bars perpendicular to the direction of the muscle fibers. A stainless steel circular electrode (3 cm of diameter) was also used as a reference electrode, taped on the skin over the sternum bone region. Electromyography was performed using five channels of the Myosystem-Br1 apparatus (Data Homins Ltda.), with simultaneous acquisition, common grounding to all channels, low-pass filters of 10 Hz to 5 KHz; channel input impedance of 10 GΩ in differential mode, 12 bites of dynamic resolution range, amplitude band of –10 to +10 V, and channel sampling frequency of 2 KHz. The software Myosystem I, version 3.5, was used for signal visualization and processing, also allowing, after digitalization, the signals to be analogically amplified with a 1,000× gain, filtered by a 0.01–1.5-kHz bandpass filter and sampled by a 12-b A/D converter with an acquisition frequency of 2 KHz. The EMG signals were acquired in the clinical condition of maximum voluntary contraction (4 s) and during free mastication with 5 food types (10 s and 20 s each). The masticatory cycles were evaluated by the ensemble average of the EMG signal, obtained in microvolts/second, during the time. The values of ensemble average were normalized by the value of the EMG signal of MVC, harvested by 4 s4,5.

US measurements were obtained with a real-time scanner (CS 9300, Picker International GmbH, Viena, Áustria). The real time images of masseter and temporal muscle thickness were obtained bilaterally by US in the relaxation position with no dental contacts, and during bite. The thickness in mm was measured by the method of Bakke et al.1 The Technical Error of Measurement (random error) for two repeated measurements (Dahlberg’s formula) was found to be a small deviation not exceeding 0.53 mm. The study was double blinded.

RESULTS AND DISCUSSION
During chewing the normalized values of the ensemble average obtained in masticatory cycles showed statistic difference between groups F(2,52)= 5.15; p< 0.01. Differences also were observed between width and thickness of the muscles F(2,52)= 4.96; p< 0.01. The C group showed mean (Mean = 14.97) larger than Hyper-OB (Mean = 13.82) and OB groups (Mean =13.76) (p< 0.01). Differences also were observed between width and thickness of the muscles F(1,53)= 7086.63; p< 0.000 and tasks F(1,53) = 51.12; p< 0.000 and the mean of the masseter was larger than temporal F(1,53)= 7162.42; p< 0.000. The EMG analysis by ensemble average is indicated to represent the muscular activity during chewing standardized by MVC, respectively C group = 594.44, OB= 383.17 and Hyper-OB group = 312.84.

CONCLUSION
The groups with anterior open bite, dentoalveolar and skeletal, no showed differences in physiology masticatory, as a noninvasive method that allows easy access and reproducibility, providing quantitative information about ability functional of the muscles. According to results, the masticatory muscles physiology seems associated, besides the facial pattern, with the dentoalveolar malocclusion, in this case the anterior open bite. The association between maximum bite force and occlusal contacts is higher in the posterior region than in the anterior region, although the absence of anterior guide can impair the chewing pattern and the muscle function.

REFERENCES
PILOT TEST OF “ARM BLASTER BICEP CURL” WAISTCOAT UTILIZATION ON BICEP CURL EXERCISE FOR 1-MR TEST

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INTRODUCTION

The one maximum repetition test (1-MR) is widely used by physical educators, professionals of the sports and researchers as a control variable of almost all resistance training (RT) periodization for its simple methodology, security and operational low cost. The researches demonstrate a constant preoccupation with standardization and monitoring of techniques and execution of exercises used on 1-MR test (DIAS, 2005; SALVADOR, 2005).

At countries like USA the “Arm Blaster Bicep Curl” is an implement largely commercialized for its unique design that promotes back and elbows stability during the execution on biceps curl exercise and isolates this muscle ensuring training specificity. However it was not found any research proving or not the effectnesseness of this waistcoat on 1-MR test for biceps curl exercise. Thus, the objective of this study is to elevate the reliability of 1-MR test for biceps curl exercise with the “Arm Blaster Bicep Curl” waistcoat utilization by assist the work of stabilizing muscles involved and elbow joints and also guarantee a higher activation of brachial biceps muscle during the execution of the exercise.

METHODS

For this scientific pilot study were recruited 8 male individuals apparently healthy aged between 20-35 years old, trained on RT, from Academia Vitória Sports (Vitória – ES, Brazil). For surface electromyographic analysis during biceps curl movement on 1-MR test was used EMG SYSTEM biological data acquisition equipment of 16 channels with bipolar electrodes of 11mm diameter and surface detection of 2mm. The device calibration varied between 200-500mV of division and beam displacement speed of 200ms/division. The filters were fixed in an amplitude of 10Hz for low frequency and 10KHz for high frequency.

The individual’s skin was previously trichotomized and cleaned with 70% alcohol to place the electrodes in order to reduce the impedance and eliminate eventual interferences. The electrodes were fixed at dominant brachial biceps muscle side (long head) according SENIAM’s protocol (Surface Electromyography for the Non-Invasive Assessment of Muscles). For 1-MR test execution on biceps curl exercise was used a “w” bar and Tyrex weight plates of 1, 2, 3, 5 and 10kg that were checked on a 2002 Welmy mechanical balance model R-110, maximum capacity of 150kg and minimum of 2kg (e = 100g).

The test started 2 minutes after a heat serie of 6-10 repetitions with approximately 50% of cargo used on first try of 1-MR test.

1st set: the subjects were instructed to try to execute two repetitions on biceps curl exercise without “Arm Blaster Bicep Curl” waistcoat. In positive case a second try was realized after a recovery interval of 3-5 minutes with a superior weight. In negative case (no one repetition completed) a second try was also realized, but with an inferior weight. In case of impossibility in determine the cargo for one maximum repetition the procedure was repeated in a third and last try.

2nd set: all procedures described until here were repeated. However, in this set the subjects were using “Arm Blaster Bicep Curl” waistcoat during the execution of biceps curl exercise. In both sets the cargo considered as 1-MR was the one in which the subject did only one repetition (SALVADOR, 2005; SIMÃO, 2003).

All tests were realized at the same period and under same conditions. To normalize the electromyography sign it was considered the test without waistcoat = 100%.

RESULTS AND DISCUSSION

The middle age of the 8 subjects that participated on this pilot test was 30 years old (±4.9 years old); middle height 1.76m (±0.05m); middle body weight 86.0kg (±9.5kg) and middle body fat percentage (Used protocol: Pollock 3 skinfold test) corresponding to 11.56% (±4.31%).

The middle of electromyography sign collected on brachial biceps muscle during 1-MR test without waistcoat was 660.40μv (±253.15μv), while with the implement was 691.94μv (±263.66μv) which corresponds to 105.91%. This difference denotes the tendency of the research in find a higher activation of brachial biceps muscle when using “Arm Blaster Bicep Curl” waistcoat.

The middleweight found on 1-MR test without the waistcoat was 53.75kg (±13.2kg), while with the implement was 48.75kg (±10.95kg) which corresponds to 91.08%. It means that the waistcoat provided a higher activation of brachial biceps muscle with a inferior cargo compared to the same test without this implement, showing the tendency to prove that it is really effective for what is proposed.

CONCLUSION

This study shows a tendency in elevate the reliability of 1-MR test application for biceps curl exercise with “Arm Blaster Bicep Curl” waistcoat utilization.

REFERENCES


Braz J Oral Sci. 11(2):158-347
POLYSOMNOGRAPHY IN PATIENTS WITH BRUXISM

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INTRODUCTION

Repetitive disorderly movements involving contact of the teeth (grinding/clenching) beyond normal chewing and swallowing represent the parafunction known as bruxism. These movements are manifestations of anxiety, resulting in muscle hyperactivity associated with a motor response to anxiety involving neuromotor, autonomic and cognitive components. Muscle hyperactivity is the major parafunctional factor that compromises the structures of the stomatognathic system. Episodes of bruxism are associated with changes from deep sleep to lighter sleep, involving micorarousals or arousals. Sleep bruxism (SB) may be concomitant to sleep disorders, such as obstructive sleep apnea, parasomnia, restless legs syndrome, speaking during sleep, rapid eye movement (REM) behavior disorder or insomnia. Bruxism is also related to damage to dental structures, iatrogenia, chronic pain in the mandibular musculature, head or temporomandibular joint and limited mandibular movements. The signs of SB are identified from rhythmic masticatory muscle activity (RMMA), as SB is repeated cyclically during sleep, occurring 85% in phase 2 of non-rapid eye movement (NREM) sleep. RMMA (swallowing, groaning, speaking, sighing) is the most frequent motor activity observed during sleep and is classified as bruxism in the presence of grinding of the teeth. The frequency of RMMA during sleep is three times greater in individuals with bruxism than individuals without this habit. Episodes of RMMA in individuals with and without bruxism are also associated with leg movements. Approximately 90% of episodes of bruxism and RMMA are observed together with microarousals recorded using electroencephalography (EEG) or electromyography (EMG). The aim of the present study was to determine the correlation between movements of the masseter, mentum and tibialis anterior muscles during a night of sleep using polysomnography.

METHODS

Among 30 patients spontaneously seeking treatment for sleep disorders at the Sleep Unit of the Vigo General Hospital in Spain, 12 reported SB, which was confirmed in four individuals through polysomnography in a sleep laboratory. The assessment involved the frequency of episodes of RMMA, EEG, electrooculogram and EMG of the submental/suprahydoid regions, tibialis anterior, masseter, temporal and mentum muscles (Fig. 1) as well as thoracoabdominal movements, oximetry, heart rate and nasal pressure airflow. The mean number of contractions of the mentum and masseter muscles was determined considering the total number of events in which these muscles contracted separately and simultaneously in the four patients with a polysomnographic diagnosis of bruxism in the respective REM and NREM phases of sleep. The total number of sleep disturbance events (apnea, arousals and leg movements) was also determined in the respective NREM and REM phases of sleep.

RESULTS AND DISCUSSION

A mean number of 151.5 movements were recorded, among which 67.36% corresponded to the mentum, 2.13% corresponded to the masseter and 30.51% corresponded to both muscles simultaneously (MM). The mean duration of movements was similar in the three groups of muscles. The overall movement index in relation to total sleep time was 24.13. The movement index was greater in the mentum (16.30) in comparison to the masseter (0.60) and MM (7.24). The mean leg movement index was 21.36 throughout the total sleep time. Studies demonstrate that many episodes of bruxism occur together with other body movements, which are linked with the occurrence of arousals (Fig 2).

CONCLUSION

In the present study, no association was found between the number of episodes of bruxism and the number of apnea events, but there appears to be a relationship with the number of leg movements. Further studies should be carried out to clarify this possible association.

REFERENCES

INTRODUCTION

Lateral epicondylitis is characterized by pain located at the lateral epicondyle, which may be exacerbated during resisted activities with wrist extension, pronation and supination of the forearm and grip activities, and may thus limit function. The use of a nonarticular proximal forearm orthosis, has as its main purpose, to decrease in some degree the activation of the related muscles.

OBJECTIVE

To evaluate grip strength and activity of the extensor muscles of wrist and fingers, using a commercial model of a nonarticular proximal forearm orthosis by electromyography analysis during grip task in healthy subjects.

METHODS

The study included 10 healthy volunteers females at a non-menstrual period, with a mean age of 22.3 years. They underwent electromyographic analysis of extensor carpi radialis longus and brevis (ECR) and extensor digitorum communis (EDC) during grasping with the Jamar® dynamometer. The analysis were conducted without and with the nonarticular proximal forearm orthosis at three distances distally from the lateral epicondyle. The tasks have been performed with the elbow positioned at 90° and 0° of extension. The measured pressure of the nonarticular proximal forearm orthosis in the region of the extensor muscles were quantified using a sphygmomanometer was 50mmHg. For electromyographic evaluation device was used Miotec®, 400® Miotool, connected via a USB cable to the HP pavillion dv6500 notebook®, Windows® 7. Disposable bipolar electrodes were connected to the sensors SDS500 20mm with the 2.0 software Miograph and bandpass filter 10-500Hz. The statistical method used in data analysis was the ANOVA (p value <0.05).

DISCUSSION

The electromyographic data of muscle activation are shown in table 1, and data relating to the grip strength are shown in figure 1. According to the statistical analysis, differences were observed only when analyzing the activation of the extensor digitorum communis with the elbow flexed at 90° and full extension (p<0.02). No statistical difference was observed between the groups comparing of data of palmar grip strength using Jamar® dynamometer. Normalization of EMG activity (RMS) of the studied muscles were performed with the forearm in pronation with the elbow at 90° and ECR = 187.73 (± 63.18) and EDC = 178.72 (± 54.85).

RESULTS AND CONCLUSION

Based on our data, we could infer that the elbow and orthosis position did not cause significant changes in grip strength. Among the muscle activation results, just EDC presented significant difference in electromyographic signal, related to different elbow positions, with the orthosis closer to the lateral epicondyle. According to our results, we advocate the use of the orthosis close to the lateral epicondyle due to less variation in muscle activation when compared without the orthosis.

REFERENCES


Table 1 - Means of data on muscle activation (RMS).

<table>
<thead>
<tr>
<th></th>
<th>Without Orthosis</th>
<th>Epicondyle 2 cm</th>
<th>4 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ECR</td>
<td>EDC</td>
<td>ECR</td>
</tr>
<tr>
<td>RMS</td>
<td>161.37</td>
<td>136.18</td>
<td>167.49</td>
</tr>
<tr>
<td>0° SD</td>
<td>±48.42</td>
<td>±55.15</td>
<td>±52.86</td>
</tr>
<tr>
<td>Normalization (%)</td>
<td>85.95</td>
<td>76.19</td>
<td>89.21</td>
</tr>
<tr>
<td>RMS</td>
<td>169.57</td>
<td>133.86</td>
<td>180.03</td>
</tr>
<tr>
<td>90° SD</td>
<td>±60.94</td>
<td>±54.34</td>
<td>±58.45</td>
</tr>
<tr>
<td>Normalization (%)</td>
<td>90.32</td>
<td>74.89</td>
<td>95.89</td>
</tr>
</tbody>
</table>

* Statistical difference at p <0.02.
POSTURAL CHANGES IN INDIVIDUALS PARAPLEGICS PRACTICING OR NOT ATHLETICS

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INTRODUCTION

Individuals with spinal cord injury may submit new postural control patterns involving parts intact sensorial-system (DeVivo 2002; Iunes, 1997). Whereas the presence of imbalances in musculoskeletal system could contribute to the emergence of dysfunctions of the body and that the role of the surgeon dentist and physiotherapist would be key to assessment appropriate (Ninomyia, et al., 2007), the objective of this study was to verify the effects of postural, structures paraplegy resulting from spinal cord (neurological compromise), or resulting from sports.

METHODS

Twenty individuals with an average age of 35 years old were divided into three groups: G1 group: formed by 5 individuals, sport practitioners (Professional - parathletes), persons with neurological injury with paraplegy of thoracic and lumbar structures; group G2: composed of 5 individuals, not practicing sport, people with paraplegy with neurological injury of lumbar and thoracic structures and group G3 (Control Group): composed of 10 healthy individuals or practitioners, sport not smoothly engines. Assessments were carried out by the biofotogrametria scan, followed by passive reference Protocol (Manubrium of the sternum, Acromion, Lateral epicondyle of humerus, Radio stiloid process, C7, Superior and inferior angle of the scapula). The clinical conditions were evaluated: shoulder elevation, angle of elbow and scapula rotation being loaded. Contemplating the evaluation was used the scale of New York, scoring patterns of postural compromises.

RESULTS AND DISCUSSION

With the biophotogrammetry results obtained at work, we observe that for G1, the right shoulder and elevation, presented in other groups, remained symmetric. This postural change may be directly related to the use of a wheelchair, and also with the side of dominance of individuals. The G2 did not shoulder elevation, which can be explained by the effectiveness of dynamic stabilizers, which allowed greater articulation of support from sports. For the G3, as individuals maintain a standing position the body load distribution is homogeneous.

We note that all groups have obtained greater angle of loading in the right elbow, emphasizing that all individuals of the three groups are right-handers and present greater demand in the region from the elbow to the handers and present greater demand in the region from the elbow to the shoulder elevation, angle of elbow and scapula rotation being loaded. Contemplating the evaluation was used the scale of New York, scoring patterns of postural compromises.

Under the conditions in which the study was conducted, the data obtained suggest that the paraplegy, associate or not the sport, not promoted relevant functional changes in the attitude of individuals.

REFERENCES


ACKNOWLEDGEMENT

Foundation of Support for Research of the São Paulo State.

Table 1 – Medium-sized biophotogrammetrics and standard error of clinical conditions and Right and Left Shoulder, Right and Left Elbow and Right and Left Scapula blade and Left in parathletes (G1), paraplegics individuals (G2) and control group (G3) (ANOVA p<0.05).

<table>
<thead>
<tr>
<th>Group</th>
<th>Assessment Region</th>
<th>Sig</th>
<th>Average</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>Right Shoulder</td>
<td>0.44*</td>
<td>104.39</td>
<td>±3.10</td>
</tr>
<tr>
<td></td>
<td>Left Shoulder</td>
<td>0.96*</td>
<td>100.03</td>
<td>±2.37</td>
</tr>
<tr>
<td></td>
<td>Right Elbow</td>
<td>0.26*</td>
<td>150.79</td>
<td>±4.53</td>
</tr>
<tr>
<td></td>
<td>Left Elbow</td>
<td>0.01*</td>
<td>150.87</td>
<td>±3.19</td>
</tr>
<tr>
<td>G2</td>
<td>Right Shoulder</td>
<td>0.44*</td>
<td>104.55</td>
<td>±1.36</td>
</tr>
<tr>
<td></td>
<td>Left Shoulder</td>
<td>0.96*</td>
<td>99.24</td>
<td>±1.54</td>
</tr>
<tr>
<td></td>
<td>Right Elbow</td>
<td>0.26*</td>
<td>154.41</td>
<td>±2.40</td>
</tr>
<tr>
<td></td>
<td>Left Elbow</td>
<td>0.01*</td>
<td>157.80</td>
<td>±4.07</td>
</tr>
<tr>
<td>G3</td>
<td>Right Shoulder</td>
<td>0.44*</td>
<td>101.60</td>
<td>±2.00</td>
</tr>
<tr>
<td></td>
<td>Left Shoulder</td>
<td>0.96*</td>
<td>99.65</td>
<td>±1.49</td>
</tr>
<tr>
<td></td>
<td>Right Elbow</td>
<td>0.26*</td>
<td>158.47</td>
<td>±2.78</td>
</tr>
<tr>
<td></td>
<td>Left Elbow</td>
<td>0.01*</td>
<td>165.17</td>
<td>±2.69</td>
</tr>
<tr>
<td>G1</td>
<td>Right Scapula</td>
<td>0.13*</td>
<td>128.45</td>
<td>±2.03</td>
</tr>
<tr>
<td></td>
<td>Left Scapula</td>
<td>0.18*</td>
<td>119.42</td>
<td>±6.66</td>
</tr>
<tr>
<td>G2</td>
<td>Right Scapula</td>
<td>0.44*</td>
<td>116.97</td>
<td>±4.73</td>
</tr>
<tr>
<td></td>
<td>Left Scapula</td>
<td>0.18*</td>
<td>130.78</td>
<td>±4.57</td>
</tr>
<tr>
<td>G3</td>
<td>Right Scapula</td>
<td>0.44*</td>
<td>125.57</td>
<td>±3.05</td>
</tr>
<tr>
<td></td>
<td>Left Scapula</td>
<td>0.18*</td>
<td>121.95</td>
<td>±2.08</td>
</tr>
</tbody>
</table>

* Statistical significance p ≤ 0.05
* Not significance
INTRODUCTION
In patients with chronic hemiparesis, observed alterations in the ability to remain standing in the upright posture. You can check for changes in sensory and especially the integration with higher centers. Thus, hemiparesis causes limitations in performing functional activities such as changing position in bed, sitting and walking, which is also necessary to performance of the postural control system consists of sensory and motor structures to promote the organization body to the task, allowing movement more efficient. Hemiparetic patients have an inability to maintain the stability, observing changes in the support base, and an increased area, the amplitude and frequency of oscillation of the mass center, making them more vulnerable to fall and more dependent on feedback remaining sensory.

The present study aims to determine in patients with stroke paralyzed the interference of brain injured on postural control.

METHODS
We evaluated 12 patients with chronic hemiparesis, from a year of full involvement with hemiparesis or crural predominance due to stroke. The evaluation of hemiparetic postural control was performed by measuring the total average speed of oscillation (VMO) and total area of oscillation (ATO) from the center of mass of these patients. These variables of postural control were captured by a force platform brand CEFISE® Sports Biotechnology, model square, with an acquisition frequency of 100Hz. The patients underwent three measurements of 30 seconds on the platform consecutively, without leaving the position.

Initially, the data were tabulated in the Statistical Package for Social Science (SPSS) in version 18.0, for descriptive and inferential analysis. Established as an independent variable dimidio cerebral. The dependent variables were indicators of postural control: VMO and ACT. We used t tests to verify the difference between the groups of right and left paralyzed. We adopted an $\alpha \leq 0.05$ as a way to avoid a false-positive error. The research was released by the Ethics Committee of UEPB (Protocol 04363.0.133.000-09).

RESULTS AND DISCUSSION
In Figure 1, it can be seen that the injured brain paralyzed has no influence on the VMO ($t = 1.08$, $p = 0.30$) and ACT ($t = 1.47$, $p = 0.17$). The ability of the brain injured hand to interfere in hemiparetic postural control is a matter of discussion in current literature, a fact due to sensory integration function of the right hemisphere plays in the nervous system. In another way of knowledge, Chen et al. showed that individuals with left brain injured, had the worst results for the dynamic and static balance on postural control of chronic hemiparesis.

CONCLUSION
The research concluded that the muscle incoordination of the patients with arthrogenous TMD results from the asymmetry between the pairs of muscles, contralateral and anteroposterior unbalances. It also concluded that the performance score that encompasses these various aspects is useful for discriminating TMD patients from healthy individuals.

REFERENCES
POSTURAL EVALUATION IN STUDENTS AND ITS RELATIONSHIP WITH THE USE OF THE BACKPACK

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INTRODUCTION
The stages of childhood and adolescence have extreme mobility, so they are characterized by the search of postural balance. Thus, the approach fits the activities that the child is developing, becoming postural habits that will reflect the future.¹ According to Chow et al.² when comparing the effects of use of a backpack about the position of individuals with idiopathic scoliosis and no musculoskeletal impairment was observed trunk anterior inclined, such as adjusting the center of gravity and a rotation of the trunk. The purpose of this study was to verify the presence of postural changes in students, with particular attention to the weight of their backpacks.

METHODS
The study was approved by the Ethics and Research Council of the Faculty of Philosophy and Sciences - UNESP - Marilia. 37 children of both genders, aged 10-14 years participated in the study. All participants were using the school bag and they had the Term of Consent signed by the responsible. Dynamic postural evaluation was performed using the Adam’s Test and evaluation by means of static postural by the Postural Assessment Software - SAPO. The backpacks were weight, and was correlated it to possible postural abnormalities. Statistical analysis was performed using the Mann-Whitney and the Spearman tests.

RESULTS AND DISCUSSION
It was found that 43.22% of participants had some type of scoliosis. By analyzing the static posture by photogrammetry, it was possible to trace the postural trend of individuals. Table 1 shows the postural changes in front view.

Table 1: Postural alterations in front view.

<table>
<thead>
<tr>
<th>POSTURAL TREND</th>
<th>FRONT VIEW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inclination of the head for left</td>
<td>Inclination of de shoulder for right</td>
</tr>
<tr>
<td>(48.6%)</td>
<td>(64.9%)</td>
</tr>
<tr>
<td>Inclination of the pelvis for left</td>
<td>Major distance between right acromion</td>
</tr>
<tr>
<td>(62.2%)</td>
<td>and ASIS (83.8%)</td>
</tr>
<tr>
<td>Assymetry of the lower limbs (100%)</td>
<td></td>
</tr>
</tbody>
</table>

Nery³ suggests that in assessing the alignment of the shoulders and pelvis, it is possible to identify the possibility of development of scoliosis, which was confirmed by observing the distance between the acromion and anterior superior iliac spine (ASIS), noting that most individuals have asymmetric shoulder, pelvic, or both. It was found significant statistically difference (p = 0.018) in the correlation between the weight of backpack and the misalignment of the pelvis. Although there are contradictions in the literature concerning the effects of carrying a backpack and misalignments. Likewise, no studies were found to correlate changes in the lower limbs with the use of backpack.

Table 2 shows the postural trend in posterior view. The asymmetry of the shoulder may suggest inclination to the right and a probable scoliotic curvature.

Table 2: Postural alterations in back view.

<table>
<thead>
<tr>
<th>POSTURAL TREND</th>
<th>BACK VIEW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left shoulder higher than right</td>
<td>Major distance between right acromion</td>
</tr>
<tr>
<td>shoulder (56,8%)</td>
<td>and ASIS (83.8%)</td>
</tr>
<tr>
<td>Assymetry of the lower limbs (100%)</td>
<td></td>
</tr>
</tbody>
</table>

It was visually confirmed that the results related to the positioning of the trunk were affected by the rotation of the lower limbs. According to some authors², the anterior trunk inclination increases by increasing the weight of the backpack to maintain the center of gravity over the support base. However, it was observed that the positioning of trunk influences the position of the pelvis and vice versa (p = 0.000), as well as increasing the weight loaded on the bag, causing changes in the pelvis, and hence the trunk (p = 0.007).

CONCLUSION
By linking the use of backpack with posture changes was noted that using backpack influences, especially in misalignment of the pelvis and trunk. Thus, like to be important to make an educational and preventive measures in schools to minimize the occurrence of such changes. However, the literature is still scarce to ensure definitely the relationship between the use of the school bag and the postural alterations.

ACKNOWLEDGMENTS
The authors gratefully acknowledge the financial support from FAPESP (Foundation for Research Support of São Paulo - Brazil) and to State University of Campinas for contribute to this work.

REFERENCES
POSTURE ANALYSIS OF INDIVIDUALS WHEELCHAIR USERS IN SEATS OF DIFFERENT DENSITIES FOAM BY PHOTOGRAMMETRY

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INTRODUCTION

Postural interventions are common in individuals with hemiplegia resulting from stroke, since they often have impoverished sitting postures and a pelvic obliquity being a common finding. Therefore, the lack of research and the use of measurement tools bring poor scientific evidence that relates to improve function and comfort in sitting posture of seating interventions [1,2,3]. Thus, the major objective of this research is to evaluate the influence of combinations of seats with foams of different densities in the sitting posture of those individuals.

METHODS

This study was approved by Ethics Committee of the Association for Assistance to Disable Children (AACD). Survey participants were informed about the procedures and signed a consent form after Enlightenment.

Eighteen wheelchair users with diagnosis of hemiplegia were evaluated. Seventeen anatomical points were marked in the anterior and posterior frontal plane. So, photographic records of the sitting posture were carried out in four situations: on a standard surface without seat foam (A0), on a seat foam of density 33 Kg/m³ placed over the standard surface (A1), on a seat foam of density 63 Kg/m³ in a half side and 40 kg/m³ in the other (A2) and on a seat foam of density 33 Kg/m³ in a half and 40 kg/m³ interleaved with two layers of Ethyl Vinil Acetate (E.V.A.) in the other (A3). The highest density of each combinations was placed under the hemisphere who was receiving largest weight-bearing according to clinical assessment. Eleven angles were defined from the anatomical points marked, and their values were obtained using the software of postural analysis CorporisPro®. For statistical analysis a paired t-test was used to compare how the mean of each data set has changed after the modification of the seats.

RESULTS AND DISCUSSION

The sample has included eleven men and seven women. The average age was about 63 years old, and 61% were below 65 years old. Regarding the motor sequel it was a balance between the left and right hemiplegia. The Pearson correlation has not shown statistical significance between the variables age, weight, time of injury and body alignment. The findings related to postural alignment in the control condition (A0) indicate a significant postural misalignment in the sample and for angular variations in the different seat configurations compared to this situation.

Table 1: P values for each angle measured

<table>
<thead>
<tr>
<th>Ângulos</th>
<th>A0xA1</th>
<th>A0xA2</th>
<th>A0xA3</th>
<th>A1xA2</th>
<th>A1xA3</th>
<th>A2xA3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.135</td>
<td>0.008*</td>
<td>0.147</td>
<td>0.454</td>
<td>0.615</td>
<td>0.221</td>
</tr>
<tr>
<td>2</td>
<td>0.996</td>
<td>0.933</td>
<td>0.239</td>
<td>0.927</td>
<td>0.294</td>
<td>0.153</td>
</tr>
<tr>
<td>3</td>
<td>0.098</td>
<td>0.601</td>
<td>0.222</td>
<td>0.006*</td>
<td>0.260</td>
<td>0.002**</td>
</tr>
<tr>
<td>4</td>
<td>0.279</td>
<td>0.336</td>
<td>0.417</td>
<td>0.042*</td>
<td>0.566</td>
<td>0.016**</td>
</tr>
<tr>
<td>5</td>
<td>0.852</td>
<td>0.300</td>
<td>0.532</td>
<td>0.270</td>
<td>0.529</td>
<td>0.500</td>
</tr>
<tr>
<td>6</td>
<td>0.215</td>
<td>0.010*</td>
<td>0.173</td>
<td>0.024*</td>
<td>0.771</td>
<td>0.036**</td>
</tr>
<tr>
<td>7</td>
<td>0.0008**</td>
<td>0.203</td>
<td>0.288</td>
<td>0.0008*</td>
<td>0.002*</td>
<td>0.716</td>
</tr>
<tr>
<td>8</td>
<td>0.528</td>
<td>0.601</td>
<td>0.0004**</td>
<td>0.100</td>
<td>7.515</td>
<td>0.0001**</td>
</tr>
<tr>
<td>9</td>
<td>0.953</td>
<td>0.131</td>
<td>0.377</td>
<td>0.014*</td>
<td>0.170</td>
<td>0.200</td>
</tr>
<tr>
<td>10</td>
<td>0.130</td>
<td>0.159</td>
<td>0.431</td>
<td>0.749</td>
<td>0.004**</td>
<td>0.007**</td>
</tr>
<tr>
<td>11</td>
<td>0.023**</td>
<td>0.0008*</td>
<td>0.003**</td>
<td>0.389</td>
<td>0.569</td>
<td>0.758</td>
</tr>
</tbody>
</table>

*Ho greater than **Ho less than

The results point to the high number of individuals of working age suffering from a stroke and the rehabilitation process may benefit this population through seating, because the use of different densities of foam in the seat showed evidence of improvement not only in pelvic but other body segments. Moreover, is noteworthy that visual assessment is susceptible to errors thus, photogrammetry shows an assist method for evaluating postural function of these individuals.

CONCLUSION

Postural interventions are common in individuals with hemiplegia resulting from stroke, since they often have impoverished sitting postures and a pelvic obliquity being a common finding. Therefore, the lack of research and the use of measurement tools bring poor scientific evidence that relates to improve function and comfort in sitting posture of seating interventions [1,2,3]. Thus, the major objective of this research is to evaluate the influence of combinations of seats with foams of different densities in the sitting posture of those individuals.

REFERENCES

PRE-SCHOOL CHILDREN: CORRELATION BETWEEN HYPERMOBILITY AND JOINT FLEXIBILITY

INTRODUCTION

It is known that hypermobility and joint flexibility are important variables in the case of assessments in children. Children during growth and development suffer the action of intrinsic and extrinsic factors (environment, heredity, physical activity level, etc.) in your posture. Thus, asymmetries may arise, and promote negative impact on quality of life, and as a result, in adulthood.

The word flexibility, in Latin flectere, flexibilis, “to bow”, means maximum passive physiological range during a joint movement (1). This movement can be limited by bones, muscles, tendons, ligaments and joint capsules. While, joint hypermobility is the ability to play a series of joints movements in higher amplitudes than normal. (2) The aim of this study was to investigate the correlation between the flexibility of posterior trunk chain and joint hypermobility in preschool children, in order to obtain reliable reference indicators, which can contribute to the work of the health professionals.

METHODS

The study evaluates 330 children, 147 (44%) were female and 183 (56%) were male, the age was between 5 and 6 years old, from schools of the city of Londrina – PR, after informed consent form signed by parents. For detection of hypermobility, the material used was the goniometer in the city of Londrina – PR, after informed consent form signed by parents. For passive approach of the thumbs on the forearm, the “Bank of Wells”, with the box under the brand of 23 cm scale. The participant was asked to perform the reach test, and hypermobility, identified as Beighton et al. criteria are correlated. This fact indicates that children with hypermobility have a higher degree of joint flexibility. Therefore, children in preschool with hypermobility should be accompanied, because they may evolve with postural changes and are more prone to injury. Furthermore, longitudinal studies should be performed in order to verify the evolution of hypermobility and joint flexibility.

RESULTS AND DISCUSSION

Joint hypermobility was identified in 176 (53%) children, as 86 females and 90 males. It was checked the relationship between the evaluation of the flexibility and joint hypermobility ($r = 0.19$, $p = 0.0003$), that means, the children with hypermobility had a higher degree of flexibility. Studies as Grahame et al. (4) concludes that the hypermobility is a result of a laxity ligament, which is determined by genes that encode the collagen, the elastin and the fibrin, which makes the person more susceptible to the effect of injury. High degree of flexibility can also, as reported by Lamari (2), protect the joints, leading to injuries such as dislocations, ligaments laxity, among others. According to Alter et al. (5), these changes of hypermobility in children may be due to the longitudinal growth, because bones and soft tissues do not follow the same rate of growth. Thus, the bone may grow faster than the muscles, increasing muscle tension. But there is the possibility in certain stages of development that connective tissue grows faster than bones, causing the hypermobility.

CONCLUSION

It is concluded that the joint hypermobility is a common finding in preschool children. The values of flexibility, as assessed by the sit and reach test, and hypermobility, identified as Beighton et al. criteria are correlated. This fact indicates that children with hypermobility have a higher degree of joint flexibility. Therefore, children in preschool with hypermobility should be accompanied, because they may evolve with postural changes and are more prone to injury. Furthermore, longitudinal studies should be performed in order to verify the evolution of hypermobility and joint flexibility.

REFERENCES


ACKNOWLEDGMENTS

Araucaria Foundation – PPSUS.
PROFILE OF HIGH SCHOOL STUDENTS IN RELATION TO THE PAIN AND USE OF SCHOOL BACKPACK

INTRODUCTION
Back pain in children and adolescents has become increasingly common. Negrini; Carabalona suggest that exist a relationship between back pain in schoolchildren and the use of a backpack. Nevertheless, can not be definitely recommend the desirable weight that a child should carry in a schoolbag. Thus, the purpose of this study was to determine the profile of a high school students in relation to back pain, with particular attention to the weight and use of their backpacks.

METHODS
The study was approved by the Ethics and Research Council of Faculty of Philosophy and Sciences – UNESP – Marilia. 37 children of both genders, aged 10-14 years participated in the study. All participants were using the school bag and they were with the Term of Consent signed by the responsible. It was applied a structured questionnaire with personal data and anthropometric measurements, evaluation of back pain by Visual Analog Scale (VAS) and by self-report and evaluation of backpack’s weight and mode of carrying. Backpacks, after being weighed, were compared in percentage of body mass of each participant. Statistical analysis was performed using the Mann-Whitney test and Spearman test, adopting the significance level of 5%.

RESULTS AND DISCUSSION
There was no statistically significant difference when comparing the gender with the factors: age, body mass, height, BMI and weight of the backpack, which suggests that this is a homogeneous sample as it relates to gender. The average age was 13 years and it was observed that the incidence of back pain increased in proportion to age and educational level. By comparing the age with back pain, Skaggs et al. suggest that this is a risk factor for pain. Table 1 describes the means and standard deviations related to anthropometric characteristics of the participant and the weight of the backpack, as well as the ratio of backpack weight as percentage of body mass.

Table 1: Characteristics of the participant and the backpack

<table>
<thead>
<tr>
<th></th>
<th>Mean (Standard deviation of the mean)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PARTICIPANT DATA</strong></td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>49.1 ±11.9</td>
</tr>
<tr>
<td>Height (m)</td>
<td>1.6 ±0.1</td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>19.8 ±3.5</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>3.4 ±1.3</td>
</tr>
<tr>
<td><strong>BACKPACK DATA</strong></td>
<td></td>
</tr>
<tr>
<td>Backpack weight/</td>
<td>7.1 ±2.9</td>
</tr>
<tr>
<td>participant weight (%)</td>
<td></td>
</tr>
</tbody>
</table>

Regarding the assessment of back pain, it was noted that 81.1% of participants in the sample reported having back pain, and the female participants have reported greater pain (82.8%) compared to males participants (75%). According Korovessis et al. and Skaggs et al. girls have higher rates of pain, probably due to decreased muscle strength compared with that of boys. Questioning the participants about classification of pain by VAS, could observe that the majority (62.2%) rated the pain as moderate. The report of severe pain (5.4%) was observed in female participants. According Korovessis et al. girls have on average four times more likely to suffer severe pain than boys. In the correlation of pain with age, participant weight, height, BMI, weight of the backpack and the relationship between the weight of the backpack and body mass were not identify significant statistically differences.

CONCLUSION
There was a tendency on the self-report of pain among individuals and it was possible to trace the profile of this group regarding the mode and frequency of use backpack. Although not identified any significant statistical correlation between back pain and the use of the backpack, the weight carried in relation to body mass, as well as how to load, should be considered as possible risk factors for back pain for students.

REFERENCES
INTRODUCTION

In recent years sitting position, maintained for long periods, has been increasingly adopted within the job [1]. Because of this the number of musculoskeletal disorders and discomfort has increased [2]. The permanence of several hours in a sitting position can cause muscle strain and fatigue becoming more evident discomfort, especially the lumbar region [1, 3]. So the search for the reduction of musculoskeletal problems caused researchers to analyze the force distribution, biomechanical and electromyographic variables for various types of chairs and their possible tilt and height adjustments of seats and backrests [2, 4].

To assist in monitoring the correct posture during daily activities, there are studies that use clothing with integrated accelerometers and gyroscopes [5] and other studies seeking a relationship between the frequency of change of sitting posture and discomfort [3].

In this scenario, the study aims to develop a system for evaluation of sitting posture throughout the day, consisting of a force platform coupled to the column in the upper region (T1/T2), in the middle region (T12) and lower region (S1) [5].

METHODS

The block diagram of Figure 1 depicts the stages of the project which will be described hereafter.

Will be used 10 volunteers aged between 18 and 60 years, they remain at least 5 hours sitting throughout the day, with similar height and body mass, as these variables influence the results stabilometric. These people cannot have a history of motor problem, neurological disease and disorders related to the spine. To verify these criteria will be applied a questionnaire to the volunteers.

The person is placed in the correct posture in the chair before the first collection of data, and having the freedom to move their arms and back during the measurements and will not be informed the moment the collection is performed. There will be 4 collections throughout the day, lasting for one hour each measuring and with interval between each measurement of at least 1 hour.

For monitoring of the column will be used three accelerometers integrated in a development kit kinematic, with wireless communication, from company’s Shimmer, in which the sensors are affixed on the person’s column in the upper region (T1/T2), in the middle region (T12) and lower one (S1) [5].

Will be developed conditioning and acquisition systems of signals with variable gain, Butterworth low-pass filter tuned to 10 Hz and sampled at 100 Hz for a force platform with four load cells of 100 kg each, which will be bound under the chair feet.

The data will be sent to the computer through the USB communication and displayed in an interface to be implemented in Visual Studio C #. In this interface, will be displayed the collected data from the force platform, as the distribution of weight on the seat and the displacement of the COP in the antero-posterior and medial-lateral, and the settings applied to each load cell platform and change the column obtained by the accelerometers.

RESULTS AND DISCUSSION

From the data collected with accelerometers are expected to find some change in the curvature of the spine of people between the four measurements, due to muscle fatigue caused by prolonged sitting.

It is expected to find differences statistically significant between the four measurements performed by the force platform. Furthermore, it is expected to visualize a relationship between the change in curvature of the spine and COP displacement throughout the day.

CONCLUSION

The proposed system has great potential to assist in the evaluation of sitting posture of people working in this position for long periods, because the monitoring is performed at different times of day without notice to the time of collection.

In addition to the postural assessment, the system may be used for biofeedback training for people with difficulty in trunk control and analysis of seated posture.

REFERENCES


ACKNOWLEDGMENTS

Thanks to financial support from the Foundation for Research Support of Minas Gerais - FAPEMIG and Post-Graduation Program in Electrical Engineering from Federal University of Uberlândia - PPGEL / UFU.
PROPOSAL OF COMPUTATIONAL SYSTEM OF BIOFEEDBACK FOR MOTOR REHABILITATION

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INTRODUCTION
Biofeedback can be defined as a set of therapeutic procedures for measurement of parameters accurately and with a feedback, so that patients and therapists has an information about the current state of the patient and from this, training sessions are performed using visual, auditory, analog and digital resources. With this, the patient will be able to develop consciousness, confidence and it will raise the voluntary control of its physiological processes that aren’t in patterns considered normal (Schwartz, 2003). This technique can be used in treatment of phobias or to solve psychological and physiological problems and it also can be used at motor rehabilitation, to retrieve strength and the neurological functions of a muscle, after a lesion (Basmajian, 1989).

There are many modalities of biofeedback that depend of the type of physiological information that is being evaluated that can be for example, respiratory frequency, skin temperature, electromyographic response (miofeedback), galvanic skin response, electroencephalographic response, cardiac frequency (Fuller, 1977). This work presents a proposal of creating a computational system in real time for biofeedback, to be applied in motor rehabilitation since that it doesn’t exist many systems with this configuration such as, the baseline (threshold), that is defined according to the type of motor rehabilitation of the patient and the tolerable error on the session. The session has four steps in which the percentages of the baselines that the patient must reach may be varied.

RESULTS AND DISCUSSION
It has been done tests with a voluntary, in which the responses were observed in both existing therapies on the miofeedback system, with the variation of the state of the contraction and relaxation that are shown on the Figure 2 and 3. The Figure 4 shows the execution of the therapy by a voluntary.

METHODS
The system developed uses the miofeedback, which the physiological response is the level of muscular tension and consists of sessions that can be performed using two types of virtual environments, whose elements moves according with the level of contraction of the patient. The feedback is offered to the patient by visual and audio resources. It is also possible that a professional monitors the progress of the session through the graphic visualization of the electromyography signal during the therapy.

The personal information of the patients and the data of the sessions can be stored for posterior analysis. The system was developed with the language Visual C# 2008, using concurrent programming and database SQL Server 2008. The virtual three-dimensional environments were developed by the software 3D Studio Max and rendered on real time from graphic resources of the library Direct X. The acquisition of the electromyography signal is performed by the equipment EMG System, fabricated by EMG System from Brazil and the signal is rectified. It has been used disposable electrodes for detection of the signal of the passive type and non-invasive (superficial). The electromyography signal is digitalized to be used on the software Biofeedback Therapy. Figure 1 show the developed software to the computational system of biofeedback.

CONCLUSION
The computational system developed is characterized for reaching some basic requirements for the development of a system of biofeedback that uses visual and audio resources. The execution on real time of the system allowed the clear observation of the reaction of the voluntary and her attempt of self-regulate. It can be conclude that the system has potential to be applied on treatments of motor rehabilitation, as a supporting tool to the therapist and as a future work the system will be applied in patients with stroke.

REFERENCES
PROPOSAL OF ELECTROMYOGRAPHIC BIOFEEDBACK TRAINING IN VIRTUAL REALITY ENVIRONMENTS AS SUPPORT FOR MOTOR REHABILITATION AFTER STROKE

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INTRODUCTION

The management of spasticity and rehabilitation of motor function of upper limbs in post stroke is a challenge. Different approaches are employed to develop and to improve motor control after stroke, but the results are not sufficiently satisfactory yet. The biofeedback training is a promising strategy and has been investigated in the context of rehabilitation, probably by the organization of cortical activity, assisting in the process of neuroplasticity. Biofeedback is a technique of associative learning by operant or instrumental conditioning in which the individual perceives and receives information in real time, classically through visual or auditory signals, regarding the parameters and levels that are psychophysiological functioning in your body and try to regulate them through manipulation and control of signals that are displayed. This technique has become known as a clinical tool in the 1960s and is often used in the treatment of upper motor neuron lesions, especially in the relearning of motor skills, in retraining muscles and inducing relaxation of spastic muscles in patients after stroke. It is important to understand if this technique can modulate the output of the cortical activity by electroencephalographic monitoring, and if this output modulated on spinal cord motoneurons, be able to control the recruitment of muscle fibers and their contraction. Thus, the objective of study is to develop a methodology of support for rehabilitation of patients with spasticity post stroke based in biofeedback mechanisms for neuroplastic modulation of cortical and subcortical activities.

METHODS

Forty volunteers, victims of ischemic stroke, will be selected. These patients will be randomly divided into 4 groups, 2 control groups and 2 study groups. The patients of control groups will be received conventional treatment of physiotherapy, one group with time of lesion from 3 to 6 months and other group from 6 to 9 months. The patients of study groups will be divided in accord with time of lesion too and they will be received electromyographic biofeedback treatment in virtual reality environments plus conventional physical therapy. The treatment of four groups will have durability of 12 weeks with 2 sessions per week in total of 24 sessions.

During electromyographic biofeedback training, the visual feedback will be provided by a system of virtual reality (VR) that will be composed of a VR glasses. The virtual image projected will be a three-dimensionally shaped arm which will be respond commands of movement from the software processing of electromyographic activity captured on specifics muscles of the upper limb affected. The patient must reach targets with the aid of visual feedback in the form of movement of the virtual joints of the arm. Thus, assuming that the goal of the session will be relaxation of the muscles associated with elbow flexion, the feedback system will provide elbow extension of the virtual prosthesis, the extent to which the level of recruitment of motor units components of real muscles the patient’s arm (biceps) is reduced. Electroencephalographic and electromyographic signs of the affected upper limb will be monitored simultaneously during the initial and final evaluations and regular periods of training.

RESULTS AND DISCUSSION

It is expected that the electromyographic biofeedback treatment in virtual reality environments plus conventional physical therapy influence the neuromodulation of cortical reorganization after lesion, mainly in relation to cognitive learning capacity. Furthermore, allows a more homogeneous and modulated distribution in the recruitment of muscle fibers and help patients in the dynamic motor control, reducing the degree of spasticity and functional disorder of movement.

CONCLUSION

The use of electromyographic biofeedback training in virtual reality environment plus conventional physical therapy can be a promising treatment to enhance motor rehabilitation, especially of the upper limbs in patients with post-stroke sequels.

REFERENCES

INTRODUCTION
Peripheral nerve lesion besides causing a severe degeneration in the distal and proximal segments of the nerve, also promotes alterations in the skeletal muscle, characterized by reduction in the trophism, increase in the fatty and conjunctive tissue in the affected muscle. They can originate secondary complications such as pressure ulcers and osteoporosis. This way, the recovery of the muscle function post-denervation depends not only on the nervous regeneration but also on the conditions of the muscle at the moment of the reinnervation.

In this context, the Electrodiagnosis of stimulus appears in a form to help monitoring the neuromuscular recovery, through interpretation of the motor response of an injured muscle submitted to specific electric stimuli. Electrodiagnostic studies may be useful in detecting first signs of muscle reinnervation, several months before evident muscle contraction (SIQUEIRA, 2007). Performance of the exam is based on the location of specific motor points in the affected muscle that optimize the detection of reinnervation through punctual electric stimuli, though there isn’t an agreement about location of such points.

The objective of this paper was to develop a protocol to perform the Electrodiagnosis of stimulus post peripheral nerve lesion of the upper limb, ranging ulnar and median nerve in the attempt to standardize the performance of the exam.

METHODS
The determination of the muscle to be evaluated was obtained through verification of specific innervation of the nerve, following the disposition: for the ulnar nerve the evaluated muscles were abductor digit minimi of the hand and first dorsal interosseus; for the median nerve, the muscle opponens pollicis; and for the radial nerve, muscle extensor carpi radialis longus and the muscle extensor indicis. Also was performed the definition of the best positioning for the assessed limb, to standardize the exams. After that, it was determined the location of motor points in each of the muscles using as reference PEASE et. al., 2008.

The Electrodiagnosis of stimulus was performed using the equipment NeMESys 941 from the brand QUARK, with location of the motor point through current SMS, where the pen electrode (cathode) was placed and on the opposite side was placed the plaque electrode (anode).

RESULTS AND DISCUSSION
The analysis of the specific response of each pre-selected muscle to the electric stimulus generated by the Electrodiagnosis allowed the determination of the motor points where there was a better adequacy and a more effective motor response, evidenced by the performance of an arc of movement by each muscle. The definition of the positioning generated an optimization of the data collection of the Electrodiagnosis of stimulation, avoiding possible interferences and/or alterations of the results. This way it was determined the positioning and location of motor points described in figures 1, 2 and 3:

The Electrodiagnosis of stimulation is the interpretation of the motor response of a muscle when submitted to specific electric stimuli, i.e., an exam of the neuromuscular electrical activity that is based on the verification of the pattern of muscle concentration produced by several parameters of electric stimuli (ERVILHA, 1997). This way, the definition of a specific protocol to the performance of Electrodiagnosis of stimulation in peripheral nerve lesions of the upper limb is of great importance on the attempt to establish a pattern on the exams and a smaller discrepancy of results on researches and similar, when considering the evolution of the method and evidence of its effectiveness.

CONCLUSION
Due to the fact of being a method still slight used and studied in the area of rehabilitation, it is important the standardization of all variables that might interfere in the reliability of the Electrodiagnosis of stimulation test, especially when considering the location of the motor points of the muscle affected by the nervous lesion and the analysis of the values obtained. This paper establishes a more specific determination of motor points and positioning, considering the evolution of the method and its scientific divulgation.

REFERENCES
PROTOCOL SEGMENTAL STABILIZATION FOR LUMBAR SPONDYLolisthesis PATIENTS WITH GRADE I AND II: 10 WEEKS OF INTERVENTION

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INTRODUCTION

Spondylolisthesis comprises a slip of one vertebral body relative to the lower manifested with back pain and sciatica. The superficial and deep muscles, contribute to the stability target. An important risk factor for pain is the weakness and lack of motor control of muscles, especially the lumbar multifidus and transversus abdominis.

Considering the effectiveness of the process of activating and strengthening these muscles, the objective of this study was to develop a protocol for segmental stabilization, listesie for grades I and II and to evaluate its clinical significance for pain and breathing capacity.

METHODS

The sample consisted of 10 volunteers, six were available to give sequence to the intervention and 5 have fully complied with the protocol. Volunteers were of both sexes with spondylolisthesis, grade 1 and 2, selected from May to June 2011. Foram excluded, those with surgical indication, rheuma and abandonment of the intervention.

Physiotherapy initial assessment was conducted, focusing on manuvacuometria and visual analog scale (VAS). The physiotherapy intervention was the application of a protocol designed for this study (Table 1), associated with diaphragmatic breathing. The intervention was scheduled for 10 weeks, 20 sessions, lasting 50 minutes.

RESULTS AND DISCUSSION

Table 1 records the values denoted a decrease of pain in all volunteers. Contribution to learning and improvement in respiratory muscle strength (table 2), suggesting an increase in lung volume and thus the ability to breathe.

CONCLUSION

The sequence, frequency, direction and control of exercises proposed in the protocol ensured the reduction of pain and motor learning, suggesting better control of stabilizers lumbar muscle has an encouraging improvement in breathing capacity.

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ACKNOWLEDGMENTS

Agradecimento a Pro Reitoria de Extensão pela bolsa de extensão concedida à aluna.
REGISTRATION AND EVALUATION OF MANDIBULAR TRAJECTORY IN 3D: AID METHOD TO THE DIAGNOSIS OF TEMPOROMANDIBULAR DYSFUNCTION

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INTRODUCTION

The measure of the dynamic relationship of mandibular movements is useful for determining the deflections and stresses experienced by the temporomandibular joint (TMJ), which if very frequent and intense may compromise its integrity, causing changes in the trajectory when performing mandibular movements (Gallo, 2005). These TMJ disorders afflict 3-29% of people aged 19-40 years (Spilker et al, 2009), affecting their daily activities and social work, justifying the registration and evaluation of mandibular movements. However, in early stages, small flaws can be difficult to detect and quantify clinically. Thus, software for quantification of these signals has been widely developed in recent decades (Pinheiro et al, 2008). The TMJD can be described as the establishment of a series of conditions that can cause pain at the mandibular joint. May be associated with muscle and/or problems in the function of the jaw, such as loss of ability to speak, chew, eat, swallow, yawn, make facial expressions, and even breathe. The research in TMJ’s mechanics have evolved since the acquisition of trajectory traces of the jaw, that allows a precise and compact description of mandibular movement. These signals are the sum result of mandibular trajectory of the forces and torques acting on the jaw, and failures in parts of this system can generate deviations and limitations of movement, which precede the clinical signs and symptoms.

These symptoms may be headache, dizziness, toothache, ear pain, hearing problems among others (Ash et al, 1998). The aim of this work is to register the mandibular trajectory in the sagittal plane by comparing it with the classical trajectory of the Movement Envelope of Posselt (Posselt, 1952).

METHODS

Identifying changes accurately in the mandibular trajectory, is essential for planning therapy to be instituted and to minimize damage. For that, some tools were evaluated. The first is based on the simple calculation of the maximum deviations in the horizontal and vertical axes of the signal in the frontal plane. The deviation on the horizontal axis tends to verify if there was any serious deviation from the trajectory in the lateral direction. The evaluation of the vertical axis may indicate whether there is any change in the function of opening and closing, limiting it. The second method evaluates the mandibular path in the sagittal plane compared to the classical trajectory of the Movement Envelope of Posselt (Posselt, 1952).

RESULTS AND DISCUSSION

Concerning the signs of mandibular trajectory collected in the frontal plane, Figure 2 and Table 1 elucidate the lateral deviation presented by the subject I, already diagnosed with dysfunction. However, during the opening of the mouth, no loss of function is observed (deviation in the vertical axis).

CONCLUSION

The computational method used was effective in quantifying the deviations shown. It is suggested the exploration of other movements and planes, such as lateral excursion in the masticatory cycle (work and balancing) to evaluate masticatory function. Also to deepen this study to a larger number of subjects in order to create a diagnostic protocol, facilitating the activities of dentists, speech therapists, physiotherapists, among others health professionals.

REFERENCES


Figure 1: Posselt Envelope

| Table 1: Deviation for both subjects on the three axis. |
| --- | --- |
| Subject I | Subject II |
| Horizontal Deviation | Depth Deviation | Vertical Deviation | Horizontal Deviation | Depth Deviation | Vertical Deviation |
| (cm) | (cm) | (cm) | (cm) | (cm) | (cm) |
| Repetition 1 | 1.3497 | 3.7613 | 3.4541 | 0.5587 | 3.4394 | 2.3875 |
| Repetition 2 | 1.4725 | 3.7035 | 3.4206 | 0.5529 | 3.4038 | 2.5889 |
| Repetition 3 | 1.6044 | 3.9816 | 3.6588 | 0.5624 | 3.5323 | 2.5748 |
| Repetition 4 | 1.3883 | 3.7106 | 3.3601 | 0.7065 | 3.6482 | 2.4469 |
| Repetition 5 | 1.4215 | 3.6799 | 3.3945 | 0.549 | 3.635 | 2.5662 |
| Repetition 6 | 1.4469 | 3.9627 | 3.7279 | 0.5854 | 3.8051 | 2.5589 |
| Media | 1.4472 | 3.7996 | 3.5027 | 0.5858 | 3.5773 | 2.5210 |
| Standard deviation | 0.0883 | 0.1356687 | 0.15246 | 0.06048 | 0.14929908 | 0.0822943 |

With respect to the sagittal plane trajectory and its subsequent comparison with the Posselt envelope, note from Figure 3 that the area inside the envelope of the patient presenting with TMJD, is much reduced. We emphasize that this diagnosis was not possible in visual assessment.
RELATION AMONG GENERALIZED JOINT HYPERMOBILITY, PARAFUNCTIONAL HABITS AND TEMPOROMANDIBULAR DISORDER

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INTRODUCTION

Temporomandibular disorders (TMD) are the most common cause of orofacial pain. Its etiology is multifactorial, with generalized joint hypermobility (GJH) among the factors contributing to the onset of signs and symptoms of TMD. In the presence of GJH, the joint motion leads to excessive hyperextension in the joint capsule and ligaments which can cause wear and inflammation of the temporomandibular joint (TMJ). Thus, it is believed that parafunctional oral habits may cause more harm on TMJ of individuals with GJH, because the joint has less stabilization capacity in the presence of overhead incurred deleterious habits. The present study aimed to evaluate the presence of GJH and parafunctional habits in individuals with and without TMD, as well as the association of these conditions in the development of TMD.

METHODS

The study included 20 women with TMD (study group) and 20 asymptomatic (control group), mean age 26.2 years (SD ± 5.26 years). The TMD was diagnosed using the Research Diagnostic Criteria for TMD (RDC / TMD). All subjects were informed of the aims of the study and signed an informed consent. The presence of oral parafunctional habits were assessed through a questionnaire that considers 12 self-reported habits (Center for Diagnosis and Treatment of TMD, School of Dentistry - UNESP). The GJH was diagnosed in the presence of a score of ≥4 spots. In data analysis were used the chi-square, Fisher’s Exact test and logistic regression to calculate odds ratios (with a confidence interval 95%). The last one evaluated the chance of an individual, exposed to HAG and to the presence of more than five parafunctional oral habits, developing TMD relative to non-exposed to these conditions. It was assumed a significance level of 5% (p <0.05) in all tests.

RESULTS AND DISCUSSION

Among the subjects with TMD 50% had GJH, whereas only 15% of subjects in the control group had this feature (p = 0.0407). The odds ratio for individuals with GJH develop TMD was 5.68 times higher (confidence interval 1.25 to 25.62). It is believed that due to ligamentous laxity, the TMJ is overloaded, resulting in lower capacity to absorb impacts, developing more degenerative changes, internal disorders and articular inflammation. Corroborating these findings, studies showed high incidence of the GJH in patients with TMD, mainly disc disorders associated with arthritic noise. Regarding the presence of parafunctional habits, 70% of TMD patients had 5 or more habits, while the asymptomatic group only 15% had the same frequency (p = 0.0036). Still, the odds ratio for individuals with more than five habits develop TMD was 9.33 (confidence interval 2.18 to 39.98). Probably, the sum of the habits contributes to the increased vulnerability of the individual to articular imbalance. Furthermore, the parafunctional activity leads to muscular contraction which inhibits the local blood flow to the tissue, causing a greater concentration of metabolic residues and, as a consequence, fatigue, spasm and pain.

When analyzing the conditions and habits associated with GJH in individuals with and without TMD, were not found significant results (Figure 1). Winocur et. al. refer to the parafunction in patients with GJH does not necessarily jeopardize the health of the masticatory system, unless a movement disorder as click or lock joint is present. Thus, parafunction associated GJH can be more harmful to the TMJ, since the translatory motion condylar occurs under increased pressure due to the overhead joints.

CONCLUSION

In this study, both the presence of parafunctional oral habits and GJH increased the chance of developing TMD. However, this was not demonstrated with the association of these two conditions.

REFERENCES

RELIABILITY AND CORRELATION AMONG PELVIC ANGLES IN YOUNG ADULTS

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INTRODUCTION

Postural changes are important factors for low back pain generation. Studies show vertebral changes (lumbar lordosis increased or excessive sacrum rotation, for example) as major factors for pain complaints. As a result, the high incidence of postural defects in adults has reached a critical point. Several cases of back pain are related to faulty posture by bad posture habits acquired and cumulative effects of small and constant overloads for long periods, which, however, if diagnosed in time can be corrected or alleviated by restoring the proper alignment. Modern methods for diagnosis are costly and require specific training and are only found in large centers, therefore, is essential to build assessment tools that are inexpensive and accessible to the clinical reality. Many authors defend the use of photogrammetry as a tool for postural assessment. Digital images promote a complete method for filing positions and their changes as a result of body work, besides it is easier to reproduce and distribute to the clinical team. However, few studies that validated the reliability of this technique are available in the literature. In this sense, the present study aimed to evaluate the reliability of photogrammetry of the pelvis views: anterior, posterior and bilateral.

METHODS

The study was conducted in young adults 18 and 35 years-old (n=93) in the city of Diamantina/MG. Photographs were taken with digital camera’s 12.1 mega pixel mounted on a tripod level to 2 meters away from the subject’s height of 70 cm in bright reserved room, allowing privacy to the subject, and with non-reflective background to easy the angle view. The volunteers were positioned standing with arms crossed over their chest to facilitate the visualization of anatomical points scored (anterior superior iliac spine, ASIS and posterior superior iliac spine, PSIS), marked with green markers to view in lateral and anterior sides producing “relief effect”. Digital images were analyzed with the software ALCimagem, marking the pelvic angles toggle (right and left side views-PD-PE), as between the ASIS and PSIS and the horizontal; beyond the angle between the ASIS (ANT) and another between the PSIS (POST) and one vertical. The data were processed using the software BioEstat 5.0 and normality checked by the Kolmogorov-Smirnov test. The parameters were compared by paired t-test and relative reliability measured by Pearson’s correlation coefficient. The consistency between the two measures was tested by correlation coefficient (ICC), the results obtained by analysis of variance for repeated measures were classified as follows: High=0.90 to 0.99, 0.80 to 0.89=good, .70 to .79=poor; <0.69=weak. In all procedures was adopted p <0.05.

RESULTS AND DISCUSSION

Table 1 shows the values of the paired difference between the two measurements, which no significant difference was detected. The non-significance of the t test for the two measurements indicates that the effect of factors such as learning, motivation or inconsistency protocol did not influence the assessment. Relative reproductibility demonstrates the degree to which each person maintains his position in a sample of repeated measurements. The results obtained for the relative reproductibility (r=correlation coefficient) are also shown in table 1 and show satisfactory results that vary between 0.9913 and 0.976 (p<0.0001). Regarding the consistency between the two attempts, a high reliability for measuring the angle PD and PE, which had ICC above 0.90, however the reproductibility for the angles ANT and POST, in which the ICC was 0.62 and 0.73, respectively, denote that these angles may not be suitable for the diagnosis of pelvic asymmetries, since they have low consistency.

CONCLUSION

From the information obtained, we conclude that pelvic angles analyzed in side view from photogrammetry have high reliability and appropriate consistency enabling, therefore, the monitoring of possible changes in pelvic rotation. Additionally, the findings of this study revealed that the anterior and posterior angles must be analyzed with caution due to its low consistency despite the high correlation coefficient.

REFERENCES


ACKNOWLEDGMENTS

We thank to the Foundation for Research Support of Minas Gerais-FAPEMIG for financial support.

Table 1: Angles: right side view (PD), left side view (PE), anterior (ANT), posterior (POST), t test, correlation (r), intraclass correlation (CCI) and reliability classification. *p<0.0001.

<table>
<thead>
<tr>
<th>Angles</th>
<th>r</th>
<th>t test</th>
<th>CCI</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>PD</td>
<td>0.9904*</td>
<td>0.1461</td>
<td>0.9596*</td>
<td>Excellent reliability</td>
</tr>
<tr>
<td>PE</td>
<td>0.9994*</td>
<td>0.3810</td>
<td>0.9517*</td>
<td>Excellent reliability</td>
</tr>
<tr>
<td>ANT</td>
<td>0.9913*</td>
<td>0.4381</td>
<td>0.6271*</td>
<td>Poor reliability</td>
</tr>
<tr>
<td>POST</td>
<td>0.976*</td>
<td>0.3328</td>
<td>0.7389*</td>
<td>Weak reliability</td>
</tr>
</tbody>
</table>

Braz J Oral Sci. 11(2):158-347
INTRODUCTION
The muscles of the shoulder complex has an important role in the strength production and joint power in sporting activities and also daily activities. The shoulder articulation executes essential movements, as feeding, or fine movements, which involves extreme manual ability. For that, one need muscles, ligaments and articular capsule to give her estability, however it’s anatomic conformation determines more articular mobility, and less estability instead.

When estability structures don’t provide the adequate support, it may occur incorrect execution of articular biomechanic and complication like bursitis, tendinitis, shoulder lesions and instabilities. The rotator cuff syndrome has been described in association with expositions to arm repetitive movements, elevation and abduction of the arms above shoulders and also by psychosocial factors as stress, long journeys of work and insatisfactory resting periods.

Tendinitis has shown more incidence on females, between 30 and 50 years old and more at the dominant side. It’s ethyology is still controvursive. The cause factors more related are limited tissue hypoxia and local mechanical pressure.

Due to it’s high frequency and great number of work licences, with social and economic commitments, these affections maybe classified as public health problems. Due to it’s multifactorial characteristic, the present research proposes to verify what literature has shown about tendinitis affections of the rotator cuff.

METHODS
A literature revision has been made from indexed studies at data electronic basis: Health Virtual Library. Terms used for the articles searching, according to Health Science Describers (DeCS) were: tendinitis and rotator cuff.

The inclusion standarts were original articles of research published in Portuguese, Spanish or English, the over disposal on the online complete text. This way were found eighty seven (87) studies, from they which fifty (50) were included; one for not having related tendinitis, two for being incipients and don’t permit to establish conclusive analysis about the affections. This way, we way conclude that the scientific works made in the area are incipients and don’t permit to establish conclusive analysis about the subject. One way request, therefore, more studies for assertively make a diagnosis and treat the affections of the rotator cuff.

RESULTS AND DISCUSSION
Referring to diagnosis, only four (4) articles explained how tendinitis confirmation was made. For Reachard et al. (2010) the tendinopathy was defined as history of ache at the rotator cuff region, with at least three (3) months duration, besides ache during the month before the examination; and ache in one or more resisted active movements (abduction, external rotation, internal abduction. Almeida et al. (2008) did it by ultrassom examination and shoulder magnetic resonance. By other way, Van der Windt et al. (1995) used as diagnosis standart, not having restriction of passive movement, to present ache at the C5 dermatome and aching arch during elevation. Another type of verifying was by radiograph to confirm the calcareous tendinitis.

The studies which analysed the intervention referred to the arthroscopy treatment. At the research of Checchia et al. (2007) it was avaliated it’s effects in patients with calcareous tendinitis and observed to be an efficient procedure. Another research through the subject based in a retrospective study with analysis of twenty patients submitted to the shoulder arthroscopy of the calcareous tendinitis. The conclusion is that the method permits the excision of calcification in security obtaining good results related to ache and shoulder function. Van der Windt (1995), however, made a epidemiologic study where he observed that a dramatic change had occurred, concerning the utilization of open acromioplasty for arthroscopy abordation along the time.

Another type of retrospective work, evaluated the intensity of pain, and association with clinic characteristics in groups of patients with aching shoulder’s syndrome (ASS). In this study the data were taken from seventy seven (77) pontuary, and one have noticed that the shoulder ache is more frequently intense in women, and that the rotator cuff syndrome was the most frequent ethyology and also more frequently in women. It was also noticed that the numerical visual scale is a relevant instrument for measuring the pain in the aching shoulder syndrome.

Two studies made option for interview as a form of evaluation, and Rechardt et al (2010) preferred to verify the join symptoms questioning if his patients felt pain in the last thirty (30) days. After wards he asked them to point out at a manikin where was the exact point of the pain, besides another separated questions envolving pain in the neck, shoulder, neck-shoulder angle for the last thirty (30) days. Almeida et al (2008) used questions referring to personal aspects (age, sex, weight, superior dominant member, committed side), and professional (work function, time of work, anterior function, double function) and work licence (time of work licence), for the wanted to correlate tendinitis with the licence of his professional activity.

In the same study, Almeida et al (2008) observed a great number of cases of licence due to the desease of supraspinatus tendon in more percentage in a way of tendinitis, in the professional group of: sewers, hairdressers, house wives and farmers, characterizing as an important epidemiologic problem.

CONCLUSION
This way, we way conclude that the scientific works made in the area are incipients and don’t permit to establish conclusive analysis about the subject. One way request, therefore, more studies for assertively make a diagnosis and treat the affections of the rotator cuff.

REFERENCES
INTRODUCTION

After an ankle sprain, 40% of individuals continue to report the feeling of joint instability, even when there is loss of passive mechanical retention. This musculoskeletal dysfunction is called functional ankle instability (FAI).

The etiology of FAI is associated to the proprioceptive deficits. Proprioception is essential for programming the motor control necessary for precision movements, is related to the sense of repositioning. The sense of defined repositioning in the literature as the awareness of limb position in real space, or even ability to evaluate the position of a member without the aid of vision.

Therefore, this study is to analyze the sense of joint repositioning of individuals with functional ankle instability and healthy.

METHODS

The study included 12 female volunteers, basketball players, divided into two groups. The control group (CG, n = 6, age = 19.16 ± 1.17), with a score over 25 points in the questionnaire Cumberland Ankle Instability Tool (CAIT - Brazilian version) and the group with FAI (GFAI, n = 6, age = 20.33 ± 2.25), with the CAIT score below 25 points. The study excluded all participants to submit: (a) absence of clinical signs of mechanical instability in the anterior drawer test and talar tilt (b) a history of ankle injury in the six months previous history to the study.

Data were collected using an isokinetic dynamometer (System Byodex Pro 4). The volunteers were positioned second Sekir (1), and blindfolded to perform the evaluation.

Initially the test was carried out with passive repositioning the ankle positioned in 10° of inversion, being held this position for 10 seconds. After this period, the ankle was repositioned passively, the reference angle (neutral position). From this position, the device began to move with angular velocity of 1°/s, and the volunteer was asked to reproduce the target angle of 10° of inversion. In this sense, realizing the target position the volunteer should press a device that stopped the dynamometer. This test was performed in two trials. After completion of this protocol, was given a rest of two minutes and started the second protocol. The second protocol consisted of the same procedures adopted in the previous protocol, but was adopted as a target position for repositioning the range of 20° of ankle inversion.

The intra-group comparison between the first and second time each test was performed with the angle reached and the absolute error. For comparison between groups was calculated the average of two trials of the angle and the absolute error in the repositioning test in both positions evaluated.

For statistical analysis we used the Mann-Whitney test to compare intra-group and, for comparison between groups, the Wilcoxon test. For all tests was considered the significance level of p <0.05.

RESULTS AND DISCUSSION

There were no significant differences in intra-group comparisons and inter-groups (Figure 1).

Because this type of injury usually occurs forced movements in reverse at high speeds.

CONCLUSION

This study found that people with FAI have a sense of the ankle joint positioning similar to healthy subjects. Tests that use passive motion at low speeds to determine the sense of position, possibly evaluate the performance of joint mecanorecetores that respond to stimuli of low speed. In this sense, it is necessary to carry out studies with tests that use protocols closer to the mechanism of injury during a sprain, which occurs at high speed.

REFERENCES


Figure 1 - Boxplots related to the repositioning test results in 10 and 20° each attempt.
STUDY OF MUSCLE FATIGUE CAUSED BY INDOOR CYCLING TRAINING IN GYMS

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INTRODUCTION
The population concern level to perform physical activity is increasing along time. The aerobic exercises bring numerous benefits to health, and among these exercises is cycling, today with adaptation to the academies, such as spinning or indoor cycling. Indoor cycling came to Brazil in the year 20001, and was becoming an increasingly popular activity. It is a new exercise and has the advantage of being able to be held indoors, representing greater security for its practitioners against urban violence and could be performed at any time during the year regardless of weather. Among the main reasons for taking a subject practicing this exercise are: the pleasure of the activity, the esthetics reasons, the acquisition of a better physical fitness and the want to improve the quality of life 2,3. The aim of this study were: to assess the behavior of the RMS and FM of evaluated muscles, follow the evolution of these parameter settings during the development of three classes and relate the findings with the installation of muscle fatigue.

METHODS
This research is being conducted by the Faculty of physiotherapy and occupational therapy at the Federal University of Pard. All procedures were carried out in accordance with the 196/96 resolution CNS. 10 adult subjects were selected, with 3 men and 7 women, sedentary 20.1 ± 1 years old and normal BMI. The gluteus maximus, rectus femoralis, bicep femoralis and semitendinous muscles were monitored. Were observed strictly all the rules pertaining to the appropriate record of EMG signals recommended by SENIAM (Surface EMG for the non-invasive assessment of muscles)4. The EMG signal was processed in time and frequency domains. For the analysis in the time domain, value has been calculated for the root mean square (RMS) in Windows fixed a second (1,000 points). For the analysis in the frequency domain, was calculated the median frequency (MF) from a second, from the fast Fourier transform (FFT). Each subject has participated in three spinning classes, lasting 45 minutes, with one day rest. The researchers did not interfered in the protocol used by the classroom teacher, and the subjects were encouraged to use the classroom as their skills, seeking to meet the demands imposed by the teacher, within its limitations. During the course of the lesson, we collected 3 consecutive records 120 seconds (2 minutes), excluding the initial warming periods and final relaxation. In all evaluations, the subjective feeling of fatigue of the volunteer was registered (0 – 10) in a questionnaire after the test.

RESULTS AND DISCUSSION
The subjective evaluation of the fatigue showed maximum score (equivalent to 9 or 10), in all subjects, for all three classes, showing unanimity on the fatigue caused by the activity. The signals were analyzed and presented by the average EMG (RMS) and the median frequency (FM) and arranged in simple linear regression graphs, and for a quantitative comparison way, about the positive or negative trends of the slopes, using the coefficients of angulation. Figures 1 and 2 corroborate the findings of subjective evaluation of fatigue, indicating trends in all muscles to increase the RMS (p = 0.023) and decrease in FM (0.54). The literature describes this behavior corresponds to physiological response to muscle fatigue, even though the FM4 had no significant statistical difference. Between classes there was no significant difference, indicating that training for three consecutive lessons does not alter the muscle response, indicating that they have not adapted to the effort and continued the behavior of fatigue.

CONCLUSION
There was installation of muscle fatigue in all muscles evaluated according to the behavior of parameters of RMS and FM, corroborating findings of subjective evaluation of fatigue. Training for three consecutive lessons does not alter the muscle response to adaptation to fatigue.

REFERENCES

AKNOWLEGEMENTS
Financial support: FAPESPA/PIBIC/UFPA.
STUDY OF THE MUSCLE ACTIVITY IN ASTHMATIC CHILDREN DURING ASYMPTOMATIC PERIOD

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INTRODUCTION

The asthma is common in young people of the 0 to 14 years of age. The purpose of this study is using surface electromyography during the development of the static stretching protocol.

METHODS

There were 15 children both genders with asthmatic symptoms that were submitted to stretching protocols twice a week during two months. The data of the of sternocleidomastoid, upper trapezius and pectoral muscles were recorded through electromyography EMG800C by EMG System do Brazil, synchronized with thoracic sensor and sensor of pressure, following the recommendations of SENIAM in relation to EMG procedure. The study was approved by the local Ethics Committee. Disposable surface electrode (Ag/AgCl, Medical Trace®) was placed over the muscles according of recommendation of SENIAM. The EMG signals were obtained using an 8-channel module EMG800 (EMG System do Brazil Ltda), consisting of a band pass filter of 20-1000 Hz, an amplifier gain of 2000, 16 bits of resolution and a common rejection mode ratio >100 dB. The sample frequency was 2 kHz.

RESULTS AND DISCUSSION

The analysis of the electromyographic signal presented a significant decrease of the muscular activity (t-test, P<0.05). It was verified significant increase of the respiratory muscular force through the PImax and PEmax sensor (cmH20) (t-test, P<0.05). There was a significant increase of the diameter expansion of the thorax.

CONCLUSION

Among the different options treating the asthmatic children, there is a possibility to offer a physical therapy treatment through the static stretching of the respiratory muscles.

REFERENCES


Figure 1. Amplitude of muscle electrical activity before and after stretching.

Figure 2. Pressure Range of PI and PE maximum before and after stretching.
SURFACE ELECTROMYOGRAPHY IN INDIVIDUALS AFTER STROKE

INTRODUCTION

Stroke is a lesion of the central nervous system that has big impact on population’s health, being the leading cause of mortality among adults in Brazil. For its epidemiological importance, besides the potential for sequels, functional limitations and loss of muscle mass, studying the condition of these individuals after stroke aims to diagnose the functional limitations of a clear and objective way providing subsidies to treat and monitor the disabilities resulting from injury. For being an objective method, the electromyography (EMG) surface can guide and direct the physiotherapeutic treatment because it provides information about the quality of muscle contractions, the level of fatigue and motor recruitment. This study goal was to evaluate muscle activity by surface EMG during rest and at maximal voluntary contraction (MVC) in hemiplegics after stroke the affected and unaffected sides and compare the degree of muscle strength and spasticity.

METHODS

After approval by the Ethics and Research Committee of the Botucatu School of Medicine (UNESP) it was defined using a sample calculation and evaluated 12 individuals with diagnosis of stroke by computed tomography. Patients of both genders in the chronic phase of rehabilitation (up to 3 months), with no deformities, spasticity less than 3 on the modified Ashworth scale, independent gait and selective control of voluntary movement, and excluded individuals with significant cognitive alterations, receptive aphasia, expressive or conductioning, neuromuscular diseases, autoimmune or other neurological disease diagnosed previously. The following parameters were evaluated on the affected and unaffected sides: the degree of spasticity by the modified Ashworth scale and muscular strength, according to Kendall muscles rectus femoris, gastrocnemius and tibialis anterior. To record muscle activity, it was used EMG equipment, TopStar MyoTrac 3G with two active electrodes channels and a reference electrode on each channel, connected to a Toshiba laptop. The sign reading was performed on RMS (Root Mean Square) on the microvolts unit (μV). The surface EMG was performed in the muscles during rest and MVC, and recorded in each muscle group alone, four times, being called: V1 - initial rest period of the muscle (activity captured for 10 seconds prior to the exam), V2 - the first sustained MVC, default duration of 10 seconds with the goal of getting muscular endurance, and strength, V3 - CVM second sustained for 10 seconds, V4 - third MVC sustained for 10 seconds. The data were statistically analyzed for the variables using the Spearman correlation and Mann-Whitney test. The alpha value to reject the null hypothesis was 0.05.

RESULTS AND DISCUSSION

All subjects had left hemiparesis, the average age was 58 ± 4.6 years and mean duration of injury was 4 ± 0.8 months. In the assessment of spasticity, 50% had grade 1 in the muscles evaluated, 41.67% grade 2 and 8.33% grade 3. On the graduation of muscle strength 66.67% of patients had grade 5, 25% grade 4 and 8.33% grade 3 in muscles. There was no statistically significant difference (p> 0.05) when compared to electromyographic activity of the affected and unaffected sides in the muscles at times V1, V2, V3 and V4 (Table 1). These findings may be due to the monitoring of rehabilitation from the acute phase, showing a more appropriate motor control close to the non-affected side, rule authors several reports that in the chronic phase (above 30 days), the stroke survivors have fibers type II reduction, muscular fiber atrophy and motor performance, and early fatigue visible in electromyography by reducing the amplitude of the CVM, but do not report the relationship to the realized treatment.

CONCLUSION

The EMG activity showed no statistically significant differences between the different moments in the studied muscles. We observed less muscle strength in the affected lower limb and observed that it is inversely proportional to the scale of spasticity.

REFERENCES


Table 1: EMG activity between the affected and unaffected in different stages of muscle contraction.

<table>
<thead>
<tr>
<th></th>
<th>Affected side</th>
<th>Non-affected side</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>V1 (μV)</td>
<td>V2 (μV)</td>
</tr>
<tr>
<td>Rectus femoris</td>
<td>20.8 410.2 469.2 546.5 26.0 476.8 485.7 494.1</td>
<td></td>
</tr>
<tr>
<td>Gastrocnemius</td>
<td>33.9 367.1 471.4 429.0 74.1 516.8 556.5 611.1</td>
<td></td>
</tr>
<tr>
<td>Tibialis anterior</td>
<td>46.2 445.0 504.7 544.2 44.1 618.7 628.2 506.6</td>
<td></td>
</tr>
</tbody>
</table>

μV: Microvolts; MVC: Maximal voluntary contraction; V1 - initial resting muscle; V2 – first MVC sustained for 10 seconds; V3 – second MVC sustained for 10 seconds; V4 – third MVC sustained for 10 seconds; * p<0,05
INTRODUCTION
The Surface Electromyography (sEMG) is a tool that has been widely used in the study of swallowing and few studies have examined the consumption of water. Thus, the objective of this study was to characterize the activity of the suprahyoid muscles (SHM) during the continuous consumption of 100 ml (CC100ml) water and propose values for normal EMG suggestive of SHM in healthy subjects.

METHODS
This study was approved by the Ethics in Research with humans at the Center for Health Sciences from the Federal University of Pernambuco (UFPE) through Office number 375/08. And the research was conducted at the Laboratory of Electroneuromyography the Clinical Hospital of HC UFPE.

Participants in this study, 165 subjects, of whom 148 were included (108 women and 50 men). The distribution of the sample as a function of age groups was: group 1 (20-29) with 27 subjects, group 2 (30-39) with 23 subjects, group 3 with 22 subjects in group 3, group 4 with 27 subjects, group 5 with 19 subjects, 21 subjects in group 6 and Group 7 with 9 subjects. We excluded patients who had: decompensated systemic diseases, neurological sequelae, craniofacial abnormalities or lesions or oral use of ill-fitting dentures, and electromyograms with interference and noise making it impossible to analyze the electrophysiological findings.

The equipment used has band-pass filter 20 to 500Hz, magnified 2000 times (common mode rejection> 120 dB) and a sampling frequency of 2 KHz per channel. The software (bioanalyzerBR) for data analysis was developed by Feodrippe (2010). Participants were instructed to consume 100 ml of water as they would in their homes.

The variables studied were: number of swallows made for consumption, average duration of swallows and total duration of consumption. Statistical analysis was made from the MedCalc program. Significance was tested through the analysis of variance (ANOVA) was critical cop simple model of 0.05.

Finally, proposed values for normal EMG suggestive of SHM from the calculation of the 5th percentile and 95th percentile.

RESULTS AND DISCUSSION
There were no significant differences between the sexes, the analysis of the number of swallows (ANOVA, p = 0.064) and no significant differences were found, but most significant, the average duration of swallows (ANOVA, p = 0.061), while the duration of total consumption was significantly longer in women (ANOVA, 0.006) (Table 1).

Although statistical analysis has revealed significant differences in the duration almost total consumption of 100 ml of water between the age groups (ANOVA, p = 0.069) in the observation of average values was identified a tendency to extend this duration with advancing age. And comparing the younger subjects (9.35 s) subjects aged 80 ≥ (13.20 s) there is a tendency for the older take more time to consume the contents of 100 ml of water. Vaiman, et al (2004) and Vaiman, et al (2005) found a significant increase in the total duration of consumption and increase in the number of swallows made to the consumption of 100 ml of water in the elderly aged 70 years compared to younger patients, which can be justified by anatomical and physiological changes resulting from the process of exhaustion.

A proposal for normal values suggestive of EMG EMG screening of SHM to the DC 100 ml of water are shown in Table 1. Knowing that the variability between and among subjects, methodological changes, equipment specifications, may influence these results.

CONCLUSION
The use of such data may assist clinical assessments, monitoring sessions of speech therapy and speech therapy management. But to identify the applicability of the proposed values is necessary for further studies.

REFERENCES

Table 1 - Proposed reference values for electromyographic screening for MSH CC 100 ml of water to separate groups by gender and age.

<table>
<thead>
<tr>
<th>GENDER</th>
<th>CC 100 ml</th>
<th>AGES</th>
<th>CC 100 ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL DURATION (s)</td>
<td>Women</td>
<td>5.2 – 17.7</td>
<td>20 - 79</td>
</tr>
<tr>
<td></td>
<td>Men</td>
<td>5.8 – 15.4</td>
<td>≥80</td>
</tr>
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THE ASSESSMENT OF ELECTROMYOGRAPHIC ACTIVITY OF MASSETER MUSCLE AFTER CHIROPRACTIC ADJUSTMENT

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INTRODUCTION
According to the American Academy of Orofacial Pain, temporomandibular disorders (TMD) are defined as a collective term that involves a large number of clinical problems affecting the masticatory muscles, temporomandibular joint (TMJ) and associated structures, or both. The displacement of the condylar process of the TMJ may cause inappropriate and adverse muscle activity, being one of the causes of TMD. (OKESON, 2000). By presenting subjective diagnosis, a tool capable of assessing and quantifying the integrity of the neuromuscular system is electromyography (EMG), as well as assist in the diagnosis, can also measure the effectiveness of therapies. Amongst other multifactorial treatments, the Chiropractic aims to eliminate painful affections through normalization techniques of the muscular tonus and astrocinematic. The objective of this study was to assess the electromyographic activity of masseter muscle after chiropractic manipulation of the TMJ in subjects carrying signs and symptoms of TMD.

METHODS
Descriptive quantitative study using transversal exploratory approach, sample of university students between 18 and 30 years with signs and symptoms of TMD. Each volunteer was answered the application of the Índice Anamnésico de Fonseca (IAF), validated in 1994 to classify the severity of TMD. After clinical examination was performed to identify the side and type of dysfunction, with subsequent monitoring by EMG, with parameters that complied with the standards proposed by the International Society of Electromyography and Kinesiology (ISEK/SENIAM) for placement of electrodes and acquisition of myoelectric signals, before and after the chiropractic adjustment. The data was descriptively and inferably analyzed through Shapiro-Wilk Normality test and t-Student for the paired data and Product-Moment Pearson Correlation. It was used a significance level of 5% for the null hypothesis acceptance. This study attended the Standards for Conducting Human Research and was previously approved by the Ethics and Research of the State University of Paraíba.

RESULTS AND DISCUSSION
Sample was formed by 10 volunteers of an average of 19.4±1.34 years old, average height of 1.62±0.06 meters, average weight 61.7±12.75 Kg. Regarding the assessment of severity of signs and symptoms of TMD through the IAF, the data analysis classified 50% of individuals with TMD – Mild, 30% individuals with TMD - Moderate and 20% TMD - Severe. In the analysis of electromyographic signal parameter in the frequency domain data was presented parametrical for Shapiro-Wilk Normality test and t-Student for the paired data and Product-Moment Pearson Correlation. It was used a significance level of 5% for the null hypothesis acceptance. This study attended the Standards for Conducting Human Research and was previously approved by the Ethics and Research of the State University of Paraíba.

CONCLUSION
In this study, the chiropractic adjustment was able to improve the electrical activity by recruiting more fibers of the masseter muscle during maximal voluntary isometric contraction with immediate results statistically significant. It is considered that the small sample was a limiting factor for proving the efficacy of the technique, and also suggest that further studies are conducted to evaluate the effect of the adjustment during rest.

REFERENCES
INTRODUCTION

The anterior cruciate ligament (ACL) is considered harmful and can result in significant functional losses to the individuals with a torn knee joint (Fatarelli et al. 2004). The postural alignment comprised an association of visual stimuli, proprioceptive sensitivity and the vestibular apparatus. Its synchronicity is interdependent from the harmony of other adjacent systems (Ferreira et al., 2011).

This study aimed to understand the effects of the anterior cruciate ligament reconstruction on posture using computerized biophotometer and the New York Posture Rating Chart.

METHODS

Forty male individuals, aged between 23 to 29 years (24 ± 2 years) were divided into two groups: Group I consisted of 20 healthy individuals, without diagnosis of postural changes; Group II, 20 individuals who underwent unilateral ACL reconstruction with patellar tendon graft, paired individual to individual (weight, age, and breathing pattern). The individuals were submitted to two types of evaluation: the New York Posture Rating Chart for visual posture and computerized biophotometer for posture.

The resulting evaluation values were statistically analyzed by using SPSS software, version 19.0 (SPSS Inc.; Chicago, IL, USA) and the independent t test for posture.

RESULTS AND DISCUSSION

A small change was observed between the groups in using the visual postural evaluation (Table 1). In the computerized biophotogrammetry, some postural change was found between the groups in the region of shoulders, left elbow and scapulae. These results were statistically significant only for the right shoulder (Table 2).

In this study, the groups presented postural changes predominantly in Group II –ACL. This fact may have occurred primarily because the postural alignment is an association between the visual stimuli, proprioceptive sensitivity and the vestibular apparatus. Its synchronicity is interdependent from the harmony of other adjacent systems such as the stomatognathic system. Loss of function in any of these systems can lead to balance defects and affect the individual’s postural awareness through afferent stimuli (Ferreira et al., 2011).

This study corroborates the results found by Bonfim and Barela (2005). The ACL injury generates biomechanical changes that affect the postural pattern even after its reconstruction as the postural control is decreased, even though there is some subtle improvement in trying to maintain an upright posture. These changes generate compensation in the knee biomechanics of reduced proprioceptive information of individuals, since, the ACL as well as the posterior cruciate ligament contains Pacinian corpuscles, type IV receptors and type I and III mechanoreceptors, acting directly on the knee biomechanics (Cole et al., 1995).

CONCLUSION

The study concluded that after the anterior cruciate ligament reconstruction, the individuals presented significant postural changes demonstrating the need for a follow-up by professional physiotherapists.
THE EFFECT OF THE LUCIA’S JIG ON ELECTROMYOGRAPHIC ACTIVITY OF MASTICATORY MUSCLES

INTRODUCTION
Lucia’s Jig is a technique advocated in dentistry since 1964 by Victor Lucia, having the function of promoting neuromuscular reprogramming of the masticatory system for the stabilization of the jaw without the interference of dental contacts (Santosa et al. 2006). The objective of this research was to examine the effect of using of jig, by means EMG of the masseter and temporal muscle, demonstrating the surgeon dentist to his performance and effectiveness in the masticatory system.

METHODS
In this study, were analyzed 42 subjects with normal occlusion, nasal breathing, without parafunctional habits and temporomandibular dysfunction (RDC/TMD), between the ages of 21 to 40 years, of both genders. The electromyographic recordings of masseter and temporal muscles were performed with the EMG Myosystem-Br1. The evaluation was performed before placing the device in neuromuscular reprogramming of rest postural condition and after installation in the upper central incisors (11 and 21), incisal one contact the lower central incisor tooth in the palatine portion of the device in following time periods: 0’, 5’, 10’, 15’, 20’ and 30’(minutes).

RESULTS AND DISCUSSION
Gouvéa Jr. (1995) reported that the touch of the teeth is a voluntary act, not automatic, leading to changes in muscle EMG activity of chewing. In the study, with the neuromuscular reprogramming device leading to touch teeth in certain scheduled times proposed, was seen higher values compared to the postural position of rest in times of 0’, 5’, 10’, 15’, 20’ and 30’ in right masseter and left temporal muscles; at the time of the 0’ and at the time 5’ and 30’ to the right temporal muscle. Data were subjected to statistical analysis (SPSS 17.0) with a confidence level of 95% (p <0.05).

Using the Jig of Lucia over time, not promoted increased muscle activity in relation to the clinical condition of rest, showing that if you can use this device in dentistry intra-oral according to the bibliographic reports, including, desocclude dental contacts; reprogram the proprioceptive information memory; establish the obtaining of centric relation; allow the wax bite is not perforated by occlusal contacts; allow the centralized location of condyles along with their respective articular disks, inside the articular eminence; assist in occlusal adjustment by regressive method and direct the occlusal splint thickness.

CONCLUSION
The Lucia’s jig changes the electromyographic activity, leading to a neuromuscular re-programming jaw, very important for clinical activity on surgeon dentist in correct diagnosis in occlusal position.

REFERENCES

ACKNOWLEDGEMENTS
This research was supported by Ribeirão Preto Dental School, University of São Paulo.
INTRODUCTION

The Nintendo Wii was developed in 2005 with the aim of changing the profile of inactive players for a more dynamic profile. The games most commonly used for training, treatment and rehabilitation are those that you interact all the time, such as Wii Sports which includes tennis, bowling, boxing, golf and baseball. With the Wii is an improvement of visual perceptions, balance and functional mobility, thus helping the individuals in the performance of motor tasks, activities of daily living and practical life (Taylor et al., 2011). Moreover, it is a resource differential, it does not use traditional materials of Physiotherapy. Despite these findings, not yet know the effect of the Wii in the electromyographic activity of muscles of the upper limb. The objective of this study was evaluate the electromyographic activity of the shoulder, elbow and wrist muscles in healthy individuals before and after the intervention with the game Wii Sports Tennis.

METHODS

After approval by CEP-UFTM Protocol (1909), participated in the study 12 healthy college volunteers, aged between 18 and 25 years, of both sexes with no history of joint injury or muscle in the upper limbs and no complaints of musculoskeletal pain on assessments and interventions. Our evaluation of the electromyographic activity through Electromyograph EMG800C Model, EMG system ®. The electrodes were placed in the anterior deltoid (AD), biceps (B), triceps (T), flexor carpi radialis (FRC), flexor carpi ulnaris (FCU) and extensor carpi radialis (ERC) of the right upper limb, for evaluation during a maximal voluntary isometric contraction (MVIC) and during movement serve and hit to the right side (SENIAM, 2010, Pease et al., 2008). After the initial evaluation, volunteers played tennis for 10 sessions of 30 minutes (three times per week). Subsequently, we performed a reassessment. For data analysis we considered the values of Root Mean Square (RMS) obtained in the two tasks and assessments, standardized by the MVIC. As it was verified the normality of the data, we used the Wilcoxon test with a significance level of 5%.

RESULTS AND DISCUSSION

Training with the game of tennis on the Wii has generated significant changes in EMG activity in almost all muscles tested in both the hit to the right side (DA, p = 0.01, B, p = 0.003, T, p = 0.02, FRC, p = 0.02; FUC, p = 0.01 and ERC, p = 0.02), as in the serve (DA, p = 0.09, B, p = 0.002, T, p = 0.009; FRC, p = 0.001; FUC, p = 0.001 and ERC, p = 0.02). There was a lower electromyographic activity and a lower inter-subject variability after training with the Wii (Figures 1 and 2). Such behavior may be related to changes related to learning. Ertan et al (2003) have shown changes in EMG activation between beginners and elite archers that optimize the movements. Another important aspect which corroborates the present study is highlighted by Zachry et al (2005). According to them, less electromyographic activity reflects an economy motor. This was observed when the subjects were investigated using an external focus of attention compared to a procedure. This external focus would be the Wii in this study.

CONCLUSION

In this study, we observed a decrease in the value of intensity and variability of the electromyographic activity of muscles responsible for movements of hits and serve used in trained tennis game through the Wii.
INTRODUCTION
The lumbar pain is a subject very discussed and that he/she expands more and more. A person’s probability to have at least an episode of lumbar pain along his/her life is from 70% to 80%, being the fundamental prevention, and like this the importance of the protection to articulate and conservation of energy, that seeks to the integrity of the structures articulate. The electromyography allows to analyze and to interpret the functional integrity of the system neuromuscular before the electric activation. To leave of that resource, the present study has as objective evaluates the effect of the change postural in the muscular activity of the oblique muscles express and multifidus.

METHODS
Twenty two subjects participated in the study, of both sexes, in the age group from 18 to 25 years, of both masculine and feminine, healthy goods, that you/they didn’t practice physical exercise and without complaints of lumbar pain. For the collection of the activity of the oblique muscles express and multifidus, the apparel MIOTEC model was used MIOTOOL 400 of 4 channels; for the acquisition and the analysis of the electromyography sign was used the program MIOGRAPH. In previous view, two electrodes were put in the external oblique muscle, to the right (channel 1) and other the left (channel 2), and in view subsequent two electrodes in the lumbar area of the muscle multifidus, to the right (channel 4) and to the left (channel 3) and also a reference electrode in C7. For the normalization of the electromyography sign, the participants accomplished three voluntary isometric contractions maximum (CIVM) for flexing and for trunk extension. The participants raffled, through opaque envelopes and stamped, the order of accomplishment of the 6 changes posturals, which could be initiate without or with the protection orientation to articulate, lying for seating, or seating for lying.

RESULTS AND DISCUSSION
Through the electromyography, they were made comparisons of the medium and maximum values generated (in percentage in agreement with CIVM), in the intention of to observe which presented larger muscular electric activity in each one of the four channels of the changes posturals, representative of each muscle. Among the changes seating posturals for lying, being compared the medium values the right multifidus presented difference larger statistic significant (p=0.013 *); being compared the maximum values (Table 2) the change seating postural for lying with protection to articulate accomplished on the left side presented muscular electric activity significantly larger, so much through the left multifido (p=0.012 *) as of the right multifido (p=0.010 *). These multiple comparisons demonstrated difference statistic significant (p <0.05 *) between the electric activity of the oblique left and the left multifidus and a tendency the statistical of difference between the electric activity of the oblique left and the right multifidus. Among the changes lying posturals for seating, being compared the medium values just the muscle left multifidus presented difference statistic significant (p=0.013 *); being compared the maximum values (Table 4) the left multifidus presented difference statistic significant (p=0.034 *) in the change lying postural for seating with protection to articulate, on the left side. The present study was elaborated with the intention of to understand and to verify the muscular answers when taking place a protection technique to articulate, and it was waited as soon as, when lying down and to sit down with the orientation there would be positive answers in relation to the protection of the lumbar musculature, however the found data showed that can have controversies.

CONCLUSION
It is possible affirms that it is not enough to pass the protection orientation to articulate for the patient with simple commands, saying to support the arm and to lie down first of side, when lying down, and to turn first of side, for later to get up, when leaving the bed; but yes to guide him/it to activate the musculature previous, as subsequent of trunk correctly so much, for like this not to overload the lumbar.

REFERENCES
INTRODUCTION
The use of virtual reality in healthcare is widely studied but scarcely practiced due to its elevated costs. Nintendo’s Wii Fit serves as an inexpensive option for using virtual reality in physical therapy. There are few articles concerning this new technology and none about its effect on electric muscular activity and pain. Relevance: The use of virtual reality as a rehabilitation tool has been studied since the 90’s by several authors. Virtual reality has many uses in treatment, such as pain management, motor control improvement in neurological patient, and cognitive processes improvement. Some authors even describe this alternative as therapeutic, pleasurable, motivating, and feasible, thus improving the patient’s acceptance of treatment.

METHODS
Participants: There were a total of thirty five subjects in this study, of which fifteen were male and twenty female. Participants selected were all aged between twenty and thirty years old with osteoarthritis medical diagnostic and frequently pain. They were random divided into a control group and an experimental group. Both groups were assessed at the beginning and at the end of the experiment (20 sessions of 40 minutes), with a pressure algometer (Wagner Instruments) and surface electromyography analysis (NORAXON Myotrace 400). The external abdominal obliques and the multifidus bilaterally muscles were assessed. EMG data were recorded during maximum contraction and during a five minutes walk. After initial EMG analysis, the subjects of the control group were instructed to perform a routine of leg stretches twice a week during four weeks, and the subjects of the experimental group were submitted to a Wii Fit Plus based protocol of exercises, also twice a week during four weeks. Mean and standard deviations for acquired EMG data were calculated for each of the tests performed on the groups. The ANOVA test was used to compare EMG data and pain scale between the two groups and between pre and post intervention results within each group. Statistical significance was set at a level of p<0.05.

RESULTS AND DISCUSSION
Comparison of the pain and EMG data of the experimental group before and after intervention shows a statistically significant difference (p<0.05) of the external abdominal obliques on maximum contraction test and the five minutes walk test. Data shows a decrease of pain (p=0.005) and an increase in the right and left sides for both muscles activation. The results for the control group increase after intervention but with no statistically significant difference. And there was statistically significant difference between post-intervention data of the two groups p<0.05.

CONCLUSION
The use of a Wii Fit based protocol of exercises twice a week during ten weeks led to a decrease on pain and an increase of abdominal and multifidus muscle activity with statistically difference between the stretch and Wii Fit exercise routines. Further study is needed to determine the efficacy of Wii Fit as a therapeutic tool in physical therapy.
INTRODUCTION

The Kinesio Taping® (KT) is a functional elastic bandage applied over or around the muscles to provide functional support1. It stretches up to 50% of its original length, resulting in less restriction, when compared to conventional tapes2. Within this perspective, the effect of KT has been the subject of research to evaluate its influence on muscle activation but with conflicting results. Murray2 showed increased electromyographic activity in the femoral quadriceps after KT application, in patients after Anterior Cruciate Ligament reconstruction. By contrast, Janwantanakul and Gaogasigam3 found no effect on muscle activity, among individuals who applied taping on both vastus lateralis (VL) and vastus medialis (VM) muscles. Given the above, this study aims to analyze the immediate effects of KT application in the electromyographic activity of the VL.

METHODS

Sixty healthy female volunteers, mean age of 23.3 ± 2.5 years and body mass index (BMI) of 22.2 ± 2.1 Kg/m² took part in the study. Initially, all subjects performed an initial assessment of electromyographic activity of the VL. Following this assessment, volunteers were randomly distributed, into one of three groups of 20 individuals each. The control group underwent initial assessment, remaining at rest for ten minutes, which was followed by final evaluation.

After initial assessment, the kinesio taping (KT) group was submitted to KT application (kinesio tex gold®) to rectus femoris (RF), VL and VM muscles in the dominant limb, with 50% tension on the strip, as suggested by Kase et al1. Nonelastic adhesive tape were applied to individuals from the nonelastic tape group (Cremer® S.A Brazil) also on RF, VL and VM muscles. Following intervention, subjects underwent a second evaluation, identical to the first.

We used a four-channel signal conditioner module (EMG System do Brazil®) with a 12-bits analogical-digital (A/D) converter (CAD, 12/36-60K). The device has a common-mode rejection ratio (CMRR) > 80 Db, with sampling frequency configured at 2000 Hz and the signal was filtered between 20 and 500 Hz and amplified 1000 times. EMGLab software (EMG System do Brazil®, Brazil) was used for digital analysis of the signals.

We used a self-adhesive surface electrode (Ag/AgCl, Noraxon®, USA), with single differentials and inter-electrode distance of 2cm, positioned on the VL muscle following SENIAM recommendations. The reference electrode (monopolar, self-adhesive - Noraxon®, USA), in turn, was placed on the tibial tubercle of the same limb.

The evaluation was performed by five concentric and eccentric contractions of maximum extension of the knee at 60°/s. For this evaluation we used an isokinetic dynamometer Biodex Multi-Joint System 3®, Biodex Biomedical System Inc, New York, USA.

To analyze root mean square (RMS) during concentric and eccentric evaluation, we considered the electromyographic signal of the highest torque of five recorded on the isokinetic dynamometer, with RMS normalized by maximum voluntary isometric contraction.

The Statistical package SPSS 17.0 was utilized for all statistical analyses. Intergroup behavior were analyzed using paired t-test and repeated measures one-way analysis of variance (ANOVA) were used to determine intergroup differences before and after interventions. Differences were considered significant at p≤ 0.05.

RESULTS AND DISCUSSION

There were no significant alterations in EMG activity of VL during the concentric and eccentric contractions of knee extension at 60°/s, between the initial and final assessments, in the three study groups. (Table 1) Briem et al4 assessed the effect of KT on fibularis longus electromyographic activity of the healthy athletes, finding no significant alterations in this variable. On the other hand, Hsu et al5 reported that KT application provoked a significant increase in the electromyographic activity of the lower trapezius muscle, in athletes with shoulder impingement syndrome. A number of theories attempt to explain how KT increases neuromuscular recruitment, including: 1) the tactile stimulus provided by KT activates cutaneous receptors, facilitating motor unit activation; 2) KT applied directly to the skin increases interstitial space, enhancing blood flow and possibly favoring a rise in muscle activation1. However, in the present study, no significant alterations were detected in the electromyographic activity of the VL muscle in healthy subjects, indicating that tactile stimulation promoted by KT was not sufficient to change recruitment of this muscle.

CONCLUSION

The results of the present study suggest that KT application to quadriceps femoris muscle is not capable of altering the activation amplitude of the VL muscle, in healthy women.

REFERENCES


<table>
<thead>
<tr>
<th>Variable</th>
<th>CONTROL (n= 20)</th>
<th>NONELASTIC TAPE (n= 20)</th>
<th>KT (n= 20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variables</td>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
</tr>
<tr>
<td>PRE</td>
<td>POST</td>
<td>PRE</td>
<td>POST</td>
</tr>
<tr>
<td>PRE</td>
<td>POST</td>
<td>PRE</td>
<td>POST</td>
</tr>
<tr>
<td>RMS concentric (%)</td>
<td>112.2 ± 21.5</td>
<td>110.8 ± 25.7</td>
<td>104 ± 17</td>
</tr>
<tr>
<td>RMS eccentric (%)</td>
<td>96 ± 14.4</td>
<td>89.2 ± 22.6</td>
<td>93 ± 26.3</td>
</tr>
</tbody>
</table>
INTRODUCTION

Dentofacial deformity (DFD) is defined as a facial and dental imbalance, severe enough to affect the quality of life of an individual and its correction requires an orthodontic treatment, followed by orthognathic surgery. Orofacial muscular and functional alterations are common in these individuals, since the occlusal damage affects the masticatory performance, the muscular activity and the muscular coordination. The presence of temporomandibular dysfunction (TMD) signs and symptoms in DFD has been discussed in the literature concerning different treatment phases. Thus, this research aimed to study the influence of the degree and type of TMD on the electromyographic activity of masticatory muscles, in individuals with DFD.

METHODS

This study has approved by the Research Ethics Committee with the Dental School – University of São Paulo at Bauru, SP (process # 049/2009). Thirty participants (19 females and 11 males), undergoing pre-surgical treatment, comprising the DFD group (DFDG), were assessed: 18 individuals with facial pattern III and 12 facial pattern II. In addition, a control group (CG), comprising 30 subjects with dentofacial balance, paired to DFDG in terms of gender and age, was formed. The individuals of CG were underwent interviews and myofunctional assessments through the orofacial myofunctional exam MBGR(1), so as to verify whether they met the inclusion criteria.

Anamnesis questionnaire (AQ)(2) for TMD, presenting 10 questions, met the inclusion criteria. The individuals with facial pattern III and 12 facial pattern II. In addition, a control group (CG), comprising 30 subjects with dentofacial balance, paired to DFDG in terms of gender and age, was formed. The individuals of CG were underwent interviews and myofunctional assessments through the orofacial myofunctional exam MBGR(1), so as to verify whether they met the inclusion criteria.

Anamnesis questionnaire (AQ)(2) for TMD, presenting 10 questions, met the inclusion criteria. Anamnesis questionnaire (AQ)(2) for TMD, presenting 10 questions, met the inclusion criteria.

RESULTS AND DISCUSSION

AQ results demonstrated a predominant absence of TMD and the mild degree of dysfunction, when present, for CG, while for DFDG the presence of a mild degree, followed by moderate and severe ones, was observed (Graphic 1).

Table 1- Correlation between the score of TMD and the EMG activity of the masseter (M) and temporalis (T) muscles, during the MVIC test, for DFDG and CG.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Correlation</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>AQ (CG+DFDG) x MVICM (CG+DFDG)</td>
<td>-0.29</td>
<td>0.03*</td>
</tr>
<tr>
<td>AQ (CG) x MVICM (CG)</td>
<td>-0.05</td>
<td>0.80</td>
</tr>
<tr>
<td>AQ (DFDG) x MVICM (DFDG)</td>
<td>-0.53</td>
<td>0.00*</td>
</tr>
<tr>
<td>AQ (CG+DFDG) x MVICT (CG+DFDG)</td>
<td>-0.20</td>
<td>0.13</td>
</tr>
<tr>
<td>AQ (CG) x MVICT (CG)</td>
<td>0.02</td>
<td>0.94</td>
</tr>
<tr>
<td>AQ (DFDG) x MVICT (DFDG)</td>
<td>-0.22</td>
<td>0.24</td>
</tr>
</tbody>
</table>

*statistically significant correlation

A negative and significant correlation was verified between the AQ scores and the MVIC, for the masseter (MVICM) and anterior temporalis (MVICT) muscles, when groups DFDG and CG were analyzed together, as well as specifically in group DFDG for the masseter muscle; i.e., the greater the severity of TMD, the lower the bioelectrical activity of the musculature, in the MVIC test. However, no correlation was found for the temporalis muscle, in the groups analyzed.

The presence of pain might have influenced the bioelectrical activity of the masticatory muscles evaluated in this study, since 97% of the individuals in the DFD group presented TMD, as well as 33% of subjects in the CG. Although no research was found about the relation between EMG activity and TMD, in subjects with DFD the literature highlights that individuals with normal occlusion, who have TMD, present lower electromyographic activity, as compared subjects with no TMD(3,4). Pain in the masticatory musculature is a frequent symptom which characterizes the presence of TMD in individuals with this disorder, thus, as a form of physiological pain protection, the masseter muscle reduces its activity and the temporalis muscle becomes more active(5).

CONCLUSION

The severity of TMD influenced the electromyographic activity of the masticatory muscles in DFD individuals, demonstrating that the greater severity of TMD resulted in lower bioelectric activity of this muscle, evidencing the need of interdisciplinary approach, during all steps of the dental treatment.

REFERENCES


Acknowledgements

This study has been supported by the Fundação de Amparo a Pesquisa do Estado de São Paulo – FAPESP. Grant # 2009/06562-5.

*Correlation between the score of TMD and the EMG activity of the masseter (M) and temporalis (T) muscles, during the MVIC test, for DFDG and CG.
INTRODUCTION

Upper limb’s impairment in adults with dyskinetic cerebral palsy (DCP) are poorly described, despite being shown that they are aggravated with age. Involuntary movements and spasticity, which may be associated with disease, resulting in major change in movement and contribute to functional damage. Biomechanical analysis of functional movements adopted by this population through three-dimensional evaluation has great importance for knowledge and understanding of motor deficits. The aim of this study is to analyze the angular kinematics of the movement to drink in adults with DCP.

METHODS

We conducted case-control study, approved by the Ethics Committee in Research of Nove de Julho University - 429632/2011. Dyskinetic cerebral palsy group (GPCD) was formed by 16 young adults (29.63 ± 4.42 years), 11 males and 6 females. Eleven healthy young men (24.09 ± 3.73 years), 9 females and 2 males were selected to form the control group (CG). Data collection was performed at the Movement Analysis Laboratory - Albert Einstein Hospital - São Paulo, Brazil. For kinematic evaluation, 24 retro-reflective spherical markers of 14 mm were fixed in predetermined anatomical points according to the model described by Rab, Petuskey, Bagley4,6, used as reference for build head, trunk, pelvis, arms, forearms, hands, and third fingers segments and their respective joint centers. After instrumentation, all volunteers sat in a chair of adjustable height and were asked to perform 6 repetitions of movement to bring a cylinder mug placed at 75% of maximum range of dominant upper extremity to the mouth. The trajectory and the threshold of 50 mm/s speed of marker placed on the third finger were used to determine the going, adjusting and returning phases of the task (Figure 1).

RESULTS AND DISCUSSION

Arm and forearm angular variables of DCPG and CG are shown in Table 1. Minimum value at the beginning of movement in DCPG is decreased in arm external rotation and increased in arm flexion and abduction and forearm pronation compared to CG. At the adjusting phase the maximum forearm flexion was reduced in DCPG compared to CG, and forearm pronation was increased. The ROM was higher in DCPG for the arm abduction and external rotation and forearm pronation. The ROM for forearm flexion in dyskinetic patients was lower compared to the CG, but was the forearm moved more than the others joints. The angular differences and changes in joint movements found in DCPG resemble the movement patterns observed in children with cerebral palsy(4), however, the lack of consistency is characteristic only for dyskinetic. Spasticity, which can also be present in DCP, possibly contributed to the deficits found in the task(2).

CONCLUSION

Adults with DCP starts the movement to remove the mug from the table with excessive arm abduction, flexion and pronation of the forearm; perform the movement to take to his mouth with reduced flexion and increased forearm pronation and ROM increased to transport the mug to his mouth when compared with healthy adults.

REFERENCES


Table 1 - Mean and standard deviation of the maximum and minimum angles and DOF in degrees of shoulder and elbow movements comparing of DCPG with CG. *p< 0.05.

<table>
<thead>
<tr>
<th>Minimum</th>
<th>Maximum</th>
<th>ROM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mug is removed from the table</td>
<td>Mug comes to mouth</td>
<td>Mug’s transport</td>
</tr>
<tr>
<td>Arm flexion</td>
<td>47.40°</td>
<td>46.22°</td>
</tr>
<tr>
<td>Arm abduction</td>
<td>(19.81)</td>
<td>(15.09)</td>
</tr>
<tr>
<td>Arm external rotation</td>
<td>9.49°</td>
<td>6.76°</td>
</tr>
<tr>
<td>Forearm flexion</td>
<td>4.07°</td>
<td>12.26°</td>
</tr>
<tr>
<td>Forearm pronation</td>
<td>6.88.39°</td>
<td>58.54°</td>
</tr>
<tr>
<td>Forearm pronation</td>
<td>(6.12)</td>
<td>(19.98)</td>
</tr>
</tbody>
</table>

The minimum and maximum angles and range of motion (ROM) of arm and forearm movements involved in task of take the mug to his mouth were analyzed. The kinematic data were captured by nine infrared cameras, Vicon MX* 40 (Oxford Metrics Group, Oxford, UK) with a frequency of 60 Hz. Reconstruction was made by Vicon Nexus® software, processing and biomechanical modeling calculation were made by Smart Analyzer® software (BTS spa, Milan, Italy).
INTRODUCTION
Electromyographic studies in Fibromyalgia Syndrome (FMS) have indicated that sensitization of muscle nociceptors is revealed by abnormal patterns of reflex motor neuron activation (Vierck, 2006). And if these changes occur in the masticatory muscles this could represent a relevant factor for the development of Temporomandibular Disorders (TMD) in FMS. Here we show that a different pattern of muscle activation are associated with facial pain in FMS and that no occur in TMD and raise the hypothesis that the FMS can play a triggering role of TMD.

METHODS
It was examined 26 female FMS (23 with TMD diagnoses) and 28 female TMD patients. The subjects were evaluated based on the RDC/TMD and surface electromyography (SEMG). The intensity of facial pain was assessed by the Visual Analogue Scale (VAS). The SEMG signal was recorded simultaneously by the four electrodes attached to the skin on the region of the right and left temporalis and masseter muscles, following the recommendations of The International Society of Electrophysiology and Kinesiology (ISEK). Briefly, simple active differential surface electrodes were used, composed of two parallel bars of pure silver, 1mm thick and 10mm long, with a distance of 10mm between electrodes, a 20-fold increase (gain), an input impedance of 1015 Ohms and a common-mode rejection ratio (CMRR) of 92dB (Datahominis Tecnologia Ltda). The electrodes were connected to a MyosystemBr1-P84 (portable model) signal acquisition module. The SEMG signals were amplified 100-fold at a frequency of 2 kHz and band-pass filtered (20-1000Hz - Butterworth). The reference electrode was placed to the region of the ulnar styloid process and greased with gel, while the active differential electrodes were placed on the muscle bellies. Three 15-second recordings of SEMG signals were collected with three 15-second recordings were collected at maximum intercuspation (isometry), while clenching "Parafilm M" between the premolars and molars to ensure the reliability and effectiveness of the recording (Biazzoto-Gonzalez et al., 2008). Data acquisition was controlled by a specific software program with 16-bit resolution, the Myosystem-Br1 software application, based on the median frequency (MNF) of the myoelectric signal calculations. The electromyographic signal was not normalized in this study because the SEMG was carried out on a single day, the electrodes were placed only once, and the pain reported by the subject was compared with his own SEMG signal. To analyze the data was selected the highest value of MNF between right and left masseter muscle and between right and left anterior temporalis. Subsequently linear regression analysis was performed and the level of significance was set at 5%.

RESULTS AND DISCUSSION
We found equations with positive slope for MNF and pain in FMS+TMD (n=23) and the opposite occurred in TMD (n=28) and FMS (n=3), i.e., negative slope for MNF and pain for the anterior temporalis muscle (figure 1) or masseter muscle (figure 2).

In the FMS+TMD subjects who reported higher facial pain on the VAS, higher values of the median frequency of masticatory muscles was founded, however, in this study it was not observed in individuals with TMD or FMS. In other words, may be a relationship between the increase in motor unit discharge rates of the masticatory muscles and facial pain in FMS+TMD.

It has been suggested that local orofacial pains in FMS patients are exacerbated by the presence of this syndrome, since that FMS usually begins in other parts of the body and then advances to the head and neck regions (Hedenberg-Magnusson et al., 1999). Here we raise the hypothesis that the FMS can play a triggering role of TMD, since FMS+TMD patients experience facial pain associated with a different SEMG response. Integrated Pain Adaptation Model (Murray and Peck, 2007) proposes that changes in muscle activity limit movement and thereby protect the sensorimotor system from further injury. With pain, a new, optimized motor unit recruitment strategy arises, leading pain minimization in order to maintain homeostasis. In TMD patients or FMS without TMD diagnoses, this strategy appears to occur, i.e, these patients to demand of homeostasis is preserved by minimizing the generation of further pain at rest or during the subsequent movement. In other hand, in FMS+TMD group these patterns of recruitment were not adopted by the sensorimotor system and perhaps there is an abnormal nociceptive responses that does not produce a protective muscle activation decrease, even in the presence of pain. However, more studies with larger samples sizes are needed to confirm this hypothesis.

CONCLUSION
Our electromyography study shows that FMS with TMD diagnoses experience facial pain associated with a different SEMG response. It seems that pain not inhibits muscle contraction.

REFERENCES
TRAINING OF THE PELVIC FLOOR MUSCLES DURING PREGNANCY AND AFTER THE CHILDBIRTH WITH SWISS BALL INCREASES CONTRACTILITY OF THE PELVIC FLOOR MUSCLES ASSESSED BY ELECTROMYOGRAPHIC EVALUATION

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INTRODUCTION

The pelvic floor muscle training (PFMT) has been indicated for the prevention and treatment of stress or mixed urinary incontinence and must be performed by a trained professional during pregnancy and postpartum. PFMT protocol aim to help control weight bearing on the pelvic floor during pregnancy, preparation for the second stage of labor, in addition to facilitating the return to pre-pregnancy conditions, during the puerperium. However, little is known about the effects of PFMT on the pelvic floor or pregnancy and postpartum.

Although the Swiss ball is widely used in physical therapy practice, there is, however, scientific evidence to support their use as therapeutics, especially for the treatment of pelvic floor disorders and/or voiding. Thus, this study aimed to evaluate the effect of PFMT on the pelvic floor muscle (PFM) contractility by means of electromyography with endovaginal probe, during the stages of pregnancy and puerperal remote, serving from the Swiss Ball as a facilitator in the movement.

METHODS

This is clinical, controlled, prospective, blind, study that consisted of 33 primiparous women (mean age 22.68 years). The patients were divided into three groups: (G1) 13 women with mean gestational age of 28.3 (+2.95) weeks; (G2) 10 postpartum women with mean of 49.3 (+5.84) days vaginal delivery with mediolateral episiotomy right; (G3) 10 postpartum women with mean of 46.3 (+3.60) days after delivery cesarean section. The evaluations were performed by a physiotherapist who was unaware of the treatment protocol and consisted of: (a) functional assessment of the pelvic floor (APF), by digital palpation and grading muscle contractility, according Oxford Scale (graduate of zero to five), and (b) assessment of the pelvic floor electromyography (EMG System® Brazil) by means of endovaginal probe Physio-Med Services®) to check the floor muscle contractility pelvic in microvolts (μV). The supervised protocol of PFMT consisted of ten sessions, at home, held three times a week, lasting sixty minutes each. The exercises began in the supine position, progressing to sitting and standing and were based on PFMT using the Swiss Ball (fast-twitch and slow) associated with breathing exercises and postural care. For analysis of EMG data were selected three to five seconds of maximal isometric contractions and calculated the mean of three contractions, utilizing the Root Mean Square (RMS) software generated by the EMG equipment. These data were then subjected to statistical analysis - Analysis of Variance (ANOVA) with significance level of 5%.

RESULTS AND DISCUSSION

The 33 women that participate of the study were divided into his respective groups that were homogeneous with respect to sociodemographic data (race, education, family income and marital status). As shown in Table 1, we observed a significant increase in contractility of the pelvic floor muscles after the PFMT in all groups. It was also found that there was a correlation between the assessment methods used to evaluate the contractility of the pelvic floor.

CONCLUSION

The training of the pelvic floor muscles using the Swiss Ball is an effective way to increase the contractility of the pelvic floor muscles during pregnancy and remote puerperium.
WOMEN WITH TEMPOROMANDIBULAR DISORDER EXHIBIT GREATER FATIGABILITY IN MASTIGATORY MUSCLES THAT THOSE WITHOUT TMD?

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INTRODUCTION

Temporomandibular Disorders (TMD), sub-classification of muscle-skeletal disorders, is a collective term enhancing signs and symptoms that affect the masticatory muscles, the temporomandibular joint and associated structures. Besides pain, symptoms most often observed, are also common findings as temporomandibular joint (TMJ) sounds, limited or asymmetric opening of the mouth (De Leeuw Okeson, 2011), and muscle fatigue (De Leeuw et al, 2005).

The term fatigue is used to represent a transient and gradual decrease in the ability of a muscle to perform a task (Enoka and Duchateau, 2008). One of the ways to study fatigue in the masticatory muscles is through isometry and the maximum voluntary contraction (MVC) an important variable, although investigations are also performed submaximal conditions.

Surface electromyograph (EMG) is a noninvasive technique that records the electrical activity of skeletal muscle generated by summing the action potentials of a large number of motor units, providing information such as muscle activation pattern. In fatiguing muscle contractions decrease occurs in spectral characteristics, such as median frequency (MF) (Merletti et al, 2010).

METHODS

The study included 39 volunteers, age 18–42 years, body mass index (BMI) of ≤ 25, and having dentition until the second molars. Of all the individuals, 20 presented with myogenous TMD (RDC / TMD) and 19 without symptoms of TMD (control). The examinations were performed by only one trained evaluator. All subjects signed an informed consent form after the clarification of goals and procedures of the research. The study was approved by the Ethics Committee on Research of Piracicaba Dental School - FOP / UNICAMP.

The electromyographic activity was recorded by a signal acquisition module (MyosystemBr1 P84). The reference electrode with conductive gel, bracelet-shaped, was placed near the ulnae styloid process, and the differential active when taped to the masseter and anterior temporalis muscles, on both sites, before cleaned with gauze and alcohol. The volunteers were instructed to perform the MVC, previously obtained in a dental clinic. The MVC was recorded after the clarification of goals and procedures of the research. The study was approved by the Ethics Committee on Research of Piracicaba Dental School - FOP / UNICAMP.

RESULTS AND DISCUSSION

It was applied the technique of repeated measures analysis of variance to compare means of groups (with and without TMD) and records (1, 2 and 3). The level of significance (p) was 5%.

Table 1 shows that the p values for the fatigue analysis were not significant to demonstrate differences neither to group nor the record effect.

Table 2 was selected only the group effect of the preceding table. It confirms that although the two groups exhibit the fatigue process (mean <0) no statistically significant p to differentiate control from patients, confirmed by the large overlap of confidence limits (CL).

Gay et al (1994) analyzed the masseter and anterior temporalis muscles in patients with myofascial pain syndrome and concluded that those muscles are not in a constant state of fatigue, but fatigue soon manifested when compared with normal subjects.

Based on this premise, subjects with TMD should have an inclination steeper slope representative of muscle fatigue, not confirmed by this work. The small number of volunteers and non-TMD severity the group of patients could be possible explanations for this finding.

CONCLUSION

It was not possible to differentiate women with TMD as compared to control subjects for susceptibility to fatigue in the masseter and temporal anterior region.

REFERENCES


ACKNOWLEDGMENT

We are grateful to the Foundation for Research Support of São Paulo for the acquisition of EMG equipment. We also thank the volunteers for participating.

Braz J Oral Sci. 11(2):158-347