ORIGINAL ARTICLE

Influence of temporomandibular disorders management on pain and global posture*

Influência do tratamento das desordens temporomandibulares na dor e na postura global

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ABSTRACT

BACKGROUND AND OBJECTIVES: Temporomandibular disorder is a clinical syndrome affecting primarily masticatory muscles and temporomandibular joints. Since temporomandibular joint is directly related to cervical and scapular region by means of muscle chains, postural spinal changes may induce temporomandibular joint disorders and vice-versa. The relationship between body posture and temporomandibular disorder may determine prevention and rehabilitation. So, this study aimed at evaluating the influence of temporomandibular joint disorder management on global posture of individuals diagnosed by the Research Diagnostic Criteria for Temporomandibular Disorders.

METHODS: Thirty patients were classified in control group (n=12) (without clinical diagnosis of temporomandibular disorder) and treatment group (n=17) (with diagnosis of temporomandibular disorder). These patients went through postural evaluation by photogrammetry and analysis with the Postural Evaluation Software. Treatment consisted of counseling, home physiotherapy and interocclusal device, monitored for 2 months. Control group patients have only used interocclusal device for the same period of time. After treatment a new evaluation was performed by the physiotherapy department.

RESULTS: Control group patients have shown no changes in measurements corresponding to beginning of intervention as compared to after treatment. In the treatment group, only the vertical alignment angle of the head has shown statistically significant results ($p<0.05$). To analyze pain relieve pre and post treatment data were compared with positive results for painful symptoms remission.

CONCLUSION: It is possible to conclude that global postural changes cause body adaptations and realignment, and may interfere with temporomandibular joint function and organization. Treatment was effective to relieve pain.

Keywords: Photogrammetry, Posture, Temporomandibular joint, Temporomandibular joint disorder syndrome.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A disfunção temporomandibular é uma síndrome clínica que acomete principalmente músculos mastigatórios e articulações temporomandibulares. Como a articulação temporomandibular está diretamente relacionada à região cervical e escapular por meio de cadeias musculares, alterações posturais da coluna podem acarretar distúrbios de articulação temporomandibular, e vice-versa. A relação entre a postura corporal e a disfunção temporomandibular pode estabelecer uma forma de prevenção e reabilitação. Sendo assim o objetivo deste trabalho foi avaliar a influência do tratamento da disfunção temporomandibular muscular na postura global de indivíduos diagnosticados por meio do *Research Diagnostic Criteria for Temporomandibular Disorders*.

MÉTODOS: Trinta pacientes foram classificados em grupo controle (n=12) (sem diagnóstico clínico de disfunção temporomandibular) e tratamento (n=17) (com diagnóstico de disfunção temporomandibular). Esses pacientes passaram por avaliação postural através da fotogrametria e análise pelo *Software* de Avaliação Postural. O tratamento consistiu em aconselhamento, fisioterapia caseira e uso do dispositivo interoclusal, monitorado por dois meses. Os pacientes do grupo controle apenas utilizaram o dispositivo interoclusal pelo mesmo período. Após o tratamento, uma nova avaliação foi feita pela fisioterapia.

RESULTADOS: Nos pacientes do grupo controle, não ocorreram alterações nas medidas correspondentes ao inicio da intervenção comparado ao pós-tratamento. Já no grupo tratamento, apenas o ângulo de alinhamento vertical da cabeça exibiu resultado estatisticamente significativo ($p<0,05$). Para análise da melhora da dor foi comparado antes e após o tratamento e obtiveram-se resultados positivos para remissão de sintomas dolorosos.

CONCLUSÃO: Pode-se concluir que desvios posturais globais causam adaptações e realinhamento corporal que podem interferir na função e organização da articulação temporomandibular. O tratamento foi efetivo para melhora da dor.

Descritores: Articulação temporomandibular, Fotogrametria, Postura, Síndrome da disfunção da articulação temporomandibular.

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INTRODUCTION

Temporomandibular disorder (TMD) is a term used to define a group of clinical joint, masticatory muscles and adjacent structures problems. These problems are primarily characterized by pain, joint noises and jaw irregular function or limitation[1]. They may be classified as muscular, articular or other joint problems.

TMDs triggering and perpetuation are dependent on the interaction of factors such as trauma, ligament laxity, parafunctional habits, stress, systemic changes, internal and external changes in temporomandibular joint (TMJ) structure, among others[2].

Major muscle TMD complaint is pain, but it may be followed by muscle fatigue, tension headache and mouth opening limitation[1,2]. TMD is the most frequent cause of chronic orofacial pain. Approximately 12% of general population are affected and 5% have severe enough symptoms to look for treatment[3].

Orofacial pain is defined as any type of pain in the region below the orbitomeatal line, above the neck and anterior to the ear, perceived as coming from inside or outside the oral cavity[4].

The International Association for the Study of Pain (IASP) defines pain as "unpleasant sensory and emotional experience associated to real or potential injuries", with subjective character, where "individuals use the word pain according to their learning with regard to previous experiences", and may be divided in two conditions: acute pain and chronic pain[5,6].

There are different methods to diagnose and classify most patients with TMD signs and symptoms. For this study we have used the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) because it is considered the gold standard for research. RDC/TMD maximizes the reproducibility among researchers, helping the adaptation to research and the comparison of results using the same criteria[7].

The spine is a body bony axis able to support, dampen and transmit body weight. The ideal posture is that where there is balance among supporting structures involving minimum effort and overload with maximum body efficiency. Laterally studying the spine, it is observed that most weight of the head, its center of gravity, rests on anterior cervical spine and TMJs. So, the right posture is maintained by a complex muscular mechanism involving head, neck and scapular girdle muscles. Due to these close relationships, any change in any structure may lead to postural imbalance in any body muscle chain[8].

According to the Posture Committee of the American Society of Orthopaedic Surgeons, posture may be defined as a relative arrangement of parts of the body. A good posture is a state of muscular and skeletal balance which protects against injuries body structures where structures are working or resting. Normal posture is that where there is absence of opposite forces, that is, relationships are harmonious and as a consequence there is no pain. Less than 10% of the population seem to meet such criteria[9].

The masticatory system is directly connected to the muscular system through mouth opening muscles, hyoid bone and muscles which are countersupport of occlusion and swallowing (sternocleidomastoid, trapezium, pectoral, etc.). It is integral part of the postural system due to: a) it is the link between anterior and posterior muscle chains; b) jaw and tongue are directly linked to anterior muscle chain; and c) maxilla, by means of the skull, is in relation with the posterior chain[10].

It is critical that dentists understand this relationship between TMD and global posture of patients for a more precise diagnosis to be able to globally treat patients integrating with the physiotherapist for a multidisciplinary management, thus providing improvement of symptoms and better quality of life.

This study aimed at evaluating the influence of muscle TMD management in global posture of individuals diagnosed by RDC/TMD.

METHODS

Participated in the study 70 patients of the Orofacial Pain Service, School of Dentistry Professor Albino Coimbra Filho, Federal University of Mato Grosso do Sul (FAODO-UFMS) from January to May 2013. Inclusion criteria were patients of both genders, major complaint being masticatory muscles pain; muscle pain during functional tests and having at least 20 teeth. Exclusion criteria were: patients with systemic diseases that may be mistaken for TMD (arthritis, fibromyalgia, sclerosis, inflammatory myopathy) or any type of systemic disease affecting the musculoskeletal system; patients under anti-inflammatory drugs, anticonvulsants, antidepressants or psychotropic analgesics, or history of face or neck trauma.

Medical charts were filled out according to RDC[7] by a single researcher.

In addition to palpation recommended by RDC for general analysis of patients' pain and their perception, measures were taken with the visual analog scale (VAS).

Patients were referred to the UFMS Physiotherapy course where their posture was evaluated by photogrammetry. Images were taken by a digital 10 megapixels camera over a tripod 3 meters away from participants in a studio previously assembled and gauged for this purpose.

The following anatomic points were marked with 15 mm diameter polystyrene balls: anterior plane: right and left tragus; right and left acromion; right and left upper anterior iliac spine; right and left femur larger trochanter; right and left knee articular line; medial point of right and left patella; right and left tibial tuberosity; right and left lateral malleolus. Posterior plane: lower right and left scapula angle; T3 spinous process; point on the midline of right and left leg; point on right and left Achilles tendon at mid height of both malleoli; right and left heel. Lateral plane: C7 spinous process; right upper posterior iliac spine; point between the 2nd and 3rd right metatarsal head.

Pictures were taken after markings. After being transferred to the computer, images were analyzed by postural evaluation software, namely SAPO. After evaluation by physiotherapy professionals, RDC was analyzed by a flowchart and patients were divided in treatment group (TG): patients with clinical diagnosis of muscle TMD; and control group (CG): patients without clinical diagnosis of TMD.

For this study, patients diagnosed with joint TMD were excluded and referred to FAODO Orofacial Pain Service.

Proposed treatment was according to Carlsson protocol[1] which is limited to reversible measures:

- Cognitive-behavioral guidance: avoid hard food, not chewing gums, posture at sleep and during daily activities, etc.;
- Biofeedback: observe clenching or bruxism and decrease parafunctional habit;
- Thermotherapy: wet hot compress three times a day for 20 minutes on the affected muscle;
- Local massage: massage after compress with diethylamine diclofenac in circular and rippling movements;
- Interoclusal device: anterior interocclusal device was made of acrylic autopolymerizing resin to decrease parafunctional activity intensity and to change patients' proprioception. Patients were oriented to use the device every night.

After guidance, patients were scheduled to return 7, 14, 28 and 56 days later. At every return, VAS was applied and patients' pain report was recorded.

In the last visit, and with controlled TMD, patients were submitted to new postural analysis.

CG: patients without TMD were referred to postural evaluation, have received the interocclusal device and were asked to use it for 60 days. After this period, a new postural evaluation was carried out to check for any change.

From 70 selected patients, 13 patients were excluded for having joint TMD, 16 patients went to CG and 41 to TG. For analysis of results, 27 patients were excluded due to waiver (have not come to all consultations) or because data were incomplete. So, final data distribution was 18 TG and 12 CG patients.

This study was approved by the Ethics Committee, Federal University of Mato Grosso do Sul, through the *Plataforma Brasil* under protocol 179.921/2012. All patients have signed the Free and Informed Consent Term (FICT).

RESULTS

Patients' posture angles data were descriptively analyzed (mean±standard deviation). First, all variables were submitted to Kolmogorov-Smirnov test to determine sample normality. Samples may be classified as normal distribution. Student's *t* test was used to compare before and after treatment.

No analyzed measures had significant changes between initial and final evaluations for CG ($p>0.05$) (Figure 1).

For the TG, only vertical head alignment had significant result at the level of 5% ($p=0.01$) (Figure 2).

Normality Kolmogorov-Smirnov test was used to evaluate pain improvement by VAS. Data distribution was parametrical and Student's *t* test was used. Software for statistical analysis was GraphPad Prism version 5.01 and charts were assembled by the Excel 2010 program. Comparison before and after treatment was statistically significant ($p < 0.001$). With these data one may state that treatment was effective to improve patients' pain (Figure 3).

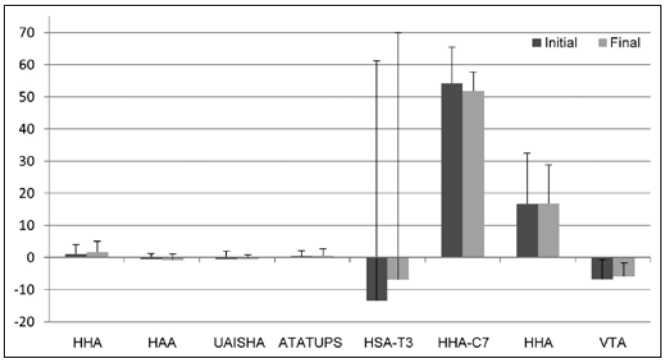

Figure 1. Control group postural measurements (values in degrees)

HHA: horizontal head alignment; HAA: horizontal acromion alignment; UAISHA: upper anterior iliac spines horizontal alignment; ATATUPS: angle between two acromions and two upper anterior iliac spines; HSA-T3: horizontal scapular asymmetry with regard to T3; HHA-C7: horizontal head alignment with regard to C7; HHA: horizontal head alignment with regard to acromion, VTA: vertical trunk alignment.

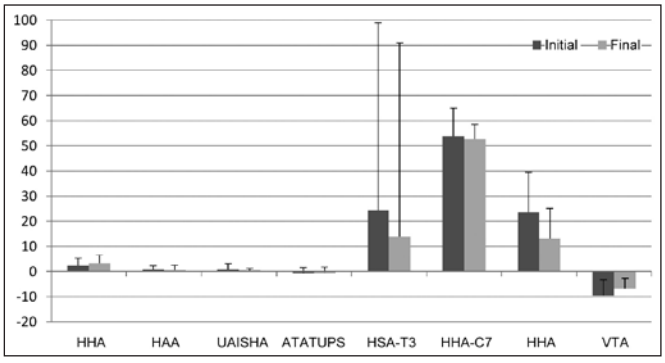

Figure 2. Treatment group postural measurements (values in degrees)

HHA: horizontal head alignment; HAA: horizontal acromion alignment; UAISHA: upper anterior iliac spines horizontal alignment; ATATUPS: angle between two acromions and two upper anterior iliac spines; HSA-T3: horizontal scapular asymmetry with regard to T3; HHA-C7: horizontal head alignment with regard to C7; HHA: horizontal head alignment with regard to acromion, VTA: vertical trunk alignment.

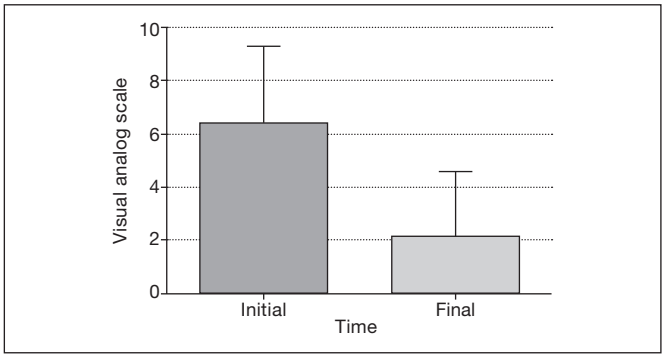

Figure 3. Treatment group visual analog scale (initial and final)

DISCUSSION

With the proposed treatment, patients had statistically significant pain improvement. The protocol of choice is widely used for noninvasive interventions[1]. One may infer that measures were effective for orofacial pain. Results are in line with a study[4] which has proven that in general, this treatment improves patients' symptoms, showing treatment efficiency and thus improving the quality of life of a population facing the distressing TMD problem.

In general terms, this study shows that there have been no statistically significant changes in postural measurements evaluated in the CG and compared before and after treatment. Munhoz, Marques & Siqueira[11] have not observed differences in global posture between control and treatment patients evaluated by photogrammetry.

In the study group, from eight analyzed angles, only one had statistically significant postural change (p=0.034), namely, vertical head alignment with regard to acromion. From a mean angle of 23.63±17.83, value after treatment was 13.17±13.78. This result confirms other studies which have found a more extended head position[13,14].

Most common cervical spinal change in TMD patients is the shortening of cervical region extensor muscles, as well as of the sternocleidomastoid muscle, causing anterior head displacement and decreasing the field of vision. Trying to compensate the field of vision, individuals compensate by increasing neck curvature[15].

A study[5] has stated the importance of postural evaluation of TMD patients. It was observed that there is a close relationship between TMD and postural changes. In its bibliographic search, it has noted that TMD patients have head anteriorization, increased lordosis and uneven shoulders.

Vertical head angle change with regard to the acromion may be explained by the anterior position of the head which will lead to jaw positioning and functioning disorders, leading to increasing tension in masticatory muscles and, as a consequence, to TMD[16].

A study[17] has investigated the relationship between global posture and TMD. It has evaluated 26 patients divided in patients with anterior disk displacement and patients without TMD. In points related to pelvis and head alignment they have found statistically different results for both groups (p=0.03). Authors state that it is not possible to confirm a cause and effect relationship, but they can prove relationship between global posture and TMD.

Authors[18] state that posture is characterized by muscle chains made of multi-joint muscles which determine the interdependence of different body joints. In this case, the imbalance of an extremity affects a different segment close or distant to it. So, the disorganization of one body segment with muscle and facial retractions would imply a compensatory posture which would also influence dependent motor functions. Such aspects may explain changes in the VHA angle in the treatment group.

Global postural disorders cause body adaptations and realignment which may interfere with TMJ function and organization[17].

VHA angle change may be attributed to body adaptation to TMD-related pain[17]. For these reasons, the multidisciplinary approach to TMD management may further contribute for the quality of life of patients.

CONCLUSION

With these results one may infer that there have been no major postural changes due to TMD management.

The angle with statistical difference was head vertical angle with regard to the acromion.

According to VAS analysis, pain remission was effective with the proposed treatment.

One may state the importance of the multidisciplinary management of patients by including physiotherapists in the TMD management team for efficient improvement and better quality of life.

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