

Temporomandibular Disorders in Females: Acupuncture Compared to Occlusal Splint

Desordens Temporomandibulares em Mulheres: Acupuntura Comparada ao Tratamento com Placa Oclusal

Los trastornos temporomandibulares en las mujeres: la acupuntura comparada con placa oclusal

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Objective: To compare the effect of acupuncture and occlusal splint in the treatment of temporomandibular disorders (TMD) in female patients. **Method:** Forty-eight female patients (mean age of 39.3±6.8 years) with diagnosed pain in muscles or joint according to RDC/TMD criteria were attended at UNESP - Aracatuba Dental School. Inclusion criteria were reported pain in the chewing muscles and/or in the temporomandibular joint measured by a visual analogue scale (range from 0 to 10) and a reported reduction of the maximum mouth opening. Excluding factors were major occlusal problems, systemic diseases, pregnancy and age below 18 years. After randomization, the first group was treated with acupuncture performed by instructed dentist. The second group was treated with occlusal splint. The outcome variables were assessed at baseline (prior to the first treatment session) and after 1, 3 and 6 months. Primary criteria of success were improvement of mouth opening and pain reduction. **Result:** Acupuncture group exhibited chewing pain decrease from 5 (at baseline) to 1, 2 and 1 after 1, 3 and 6 months, respectively. In the splint group, chewing pain decreased from 4 to 2, 1 and 2 after 1, 3 and 6 months, respectively. The mouth opening (in mm) increased from 28 (at baseline) to 42, 44 and 46 after 1, 3 and 6 months, respectively in the acupuncture group. In the splint group, mouth opening improved from 29 to 40 after 1 month, and to 43 and 42 after 3 and 6 months. A significant pain reduction was noted for both groups when compared to the baseline ($p < .001$; Wilcoxon test). Acupuncture group had a significant clinical improvement of opening mouth (Mann-Whitney). **Conclusion:** The present outcomes suggest a positive association among acupuncture and occlusal splint on the reduction of chewing pain. Acupuncture was more effective in the mouth opening increase.

Keywords: Dental Occlusion; Pain; Masticatory Muscles; Therapeutics.

INTRODUCTION

Management of temporomandibular disorders include multiple therapeutic modalities: occlusal therapy (occlusal interventions and occlusal appliances),

biofeedback exercises, psychological treatment, pharmacological approach and acupuncture. The important point is to determine what factors,

specifically, are involved in each patient, that for choosing an appropriate treatment, among the various therapeutic modalities exist, or an association of two or more treatments^{1,2,3,4,5,6,7}. The use of acupuncture and Chinese medicine aims stimulate the release of opioids by the body itself, controlling the pain sensation of the individual⁸. For Maciocia⁹ the diagnoses in Traditional Chinese Medicine are based on patterns of disharmon. The theory of Yin and Yang is widely used in Traditional Chinese Medicine explaining the histological structure, physiological function and pathological changes of organism. It also serves as a guide for diagnosis and treatment¹⁰. The nature of Yin or Yang is not absolute, but relative, and their existence is determined by indoor conditions. According Yamamura¹¹ each comprising two parts contradictory aspect transforming each other under certain circumstances: within Yin and Yang live their opposite portions. Yin contains the seed of Yang and Yang contains the seed of Yin^{9,12}. Also the energy channels provide an essential foundation for understanding the various pathological, physiological, diagnostic and therapeutic aspects of Traditional Chinese Medicine. According to the traditional theory, exist in a system for body energy channels or vessels which integrate all parts of the body, forming a unified body. Energy channels have important roles in physiological and pathological function of the connections between the tissues and organs¹¹.

In specific energy points located on meridians or channels of energy flow, lie approximately 750 acupuncture points. With different electrical resistance than the surrounding tissue, when stimulated through needles, infrared, laser or electric current, send signals to the central nervous system, causing it to block the passage of pain, promoting the balance between Yin (negative) and Yang (positive)^{8,13}.

So, the mechanism of action of acupuncture is based on the fact that the introduction of the needle into specific points on the energy meridians generates stimulus in the nerve endings of muscles, which is sent

to the central nervous system, where it is recognized and translated into three levels¹:

- hypothalamic level - the activation of the hypothalamic-pituitary leads to the release of endorphins (pain killers), cortisol (anti-inflammatory) and serotonin (antidepressant) in the bloodstream and cerebrospinal fluid;
- level of the midbrain, with activation of neurons in the grey matter, releasing endorphins which will stimulate the production of serotonin and norepinephrine;
- level of the spinal cord, with activation of interneurons in the gelatinous substance and the release of dynorphins.

In dentistry, the application of acupuncture is used in pre-treatment of patients anxious, stressed and even for hypertensive patients or patients with systemic diseases, improving the quality of care. Acupuncture for obtaining analgesia has been used in the procedures of Dentistry, Endodontics, Periodontics and Surgery, because this therapy is less traumatic than conventional anesthesia, besides decreasing the consumption of anesthetic drugs. Carola¹⁴ and Nader¹⁵ propose the use of acupuncture as an important adjunct in the treatment of temporomandibular disorders, bruxism and other myofascial symptomatology^{8,14,15} shows reduction of activity of the masseter and temporal muscles up to five days after application of acupuncture. Acupuncture is also well regarded as an alternative therapy for treatment of patients with chronic disorders in refractory to conventional therapy, as with needling certain points occurs the release of endogenous substances such as endorphins and other substances that have analgesic, anti-inflammatory and relaxing^{16,17}.

Acupuncture aims to treat not only the bruxism, but acts on the entire nervous system, stimulating the compensation mechanism and balance throughout the body. Acupuncture points are considered in TCM (Traditional Chinese Medicine) the outer area of the energy body individual's functioning as communication link between internal and external. Some concepts about

mechanisms of action of acupuncture are important to understand how it can act in cases of bruxism. The action of acupuncture opposite bruxism appears to be strongly associated with treatment of the condition of the patient, since many of the points used are related to the treatment of stress and anxiety and sleep disorders, for example, points E36, BP6, F3, ID19, VB34, EX-HN4, EXHN2. From the stimulation of certain points can change the dynamics of blood circulation and also promote muscle relaxation, remedying spasm and decreasing inflammation and pain. Furthermore, stimulation some points can promote release of hormones such as cortisol and endorphins, promoting analgesia¹⁸.

The association between bruxism and neurotransmitters of catecholamin was demonstrated by Areso¹⁹ and the reduction of these levels after acupuncture session, justifies its use in this type of treatment⁸.

For acupuncture filsofy the illness results the interaction between staff and offenders the body's response, led by central nervous system. Furthermore, Internal or external causes can disrupt the normal function of the body and affect the energy points and channels, making them more sensitive or painful to the touch. Even if a disease originates in an internal organ, the signs and symptoms can manifest themselves in distant areas, related to that energy channel associated with the organ^{20,21}. For Ross²² if the body is weakened, in depressive state, suffering from anxiety, this will be reflected negatively at nervous system central²³.

The energy channels of the stomach, small intestine, gall bladder and triple burner show up in the affected temporomandibular disorders. E6 and E7 are traditional points for local treatment of disorders of the head and neck. The localized muscle pain or myofascial pain that originates in parafunctional habits can be treated with activation points of E6, E7 and E44 under dispersion¹⁹. Bruxism also seems to respond to the points E6, E7, IG4 and TA17¹¹. The combination of points VB1, VB2, VB43, ID2, ID17, ID18 and IG4 also

shows positive results in reducing headache and facial pain.

An occlusal splint (synonyms: bite splint, bite plane, night guard, orthotic) is a removable appliance, usually fabricated of resin, most often designed to cover all the occlusal and incisal surfaces of the teeth in the upper or lower jaw. It is being used frequently in treatment of patients with temporomandibular joint disorders (TMD) and related diseases such as tension headache and neck pain. One advantage with occlusal splints is that they provide a relatively easy, inexpensive and non-harmful way to make reversible changes in the occlusion.

Occlusal splint therapy is a popular, simple and conservative modality in the treatment of TMD. Occlusal splints, which have the advantage of being noninvasive, constitute one of the most therapeutic responses used in the treatment of TMD. So, according to McNeill²⁴, the first occlusal splint was described in 1881 by Goodwillie; its popularization however developed only as from the Sixties of last century, with the "Michigan-type" occlusal splint of Ash²⁵. Today the use of the occlusal splint is usual, as some international literature attests, and its forms or its terms are so various²⁶, that an actualization of basic knowledge could be of interest for the general practitioner. An occlusal splint can be used to test a therapeutic position²⁷ before any definitive occlusal change, like a modification of vertical dimension²⁸ or the creation of a mandibular anteposition. An occlusal splint can be used for protecting teeth or prosthetic restorations against sleep pressures. But an occlusal splint is mainly used for therapeutic means²⁹. Its principle use is to prevent the patient from finding his usual occlusion of maximal intercuspal position (ICP) and to oblige him to place his mandible in a new posture, thus, resulting in a new muscular and articular balance. The patient, disturbed in his habits, will not tighten his teeth any more, like before. He will change his clenching habits and then he will not tighten any more, he will protect his teeth and his temporomandibular joint. Thus Ekberg³⁰ validated

the effect of the flat-smooth occlusal splint on muscular conditioning, resulting in the resolution of muscular contractions, in a randomized and controlled study on 60 patients. In contrast, Greene and Laskin³¹ affirmed, as early as in 1972, the importance of neurophysiological feelings and psychology in the development of the TMD and the therapy that comes from taking care of the patient. The uselessness of the occlusal splint could be deduced from this or, at least, the need for it to be discussed³². One argument against this imposes itself immediately as the use of the occlusal splint means treatment that reinforces the psychological effect of “care management”.

The goal for splint treatment is mainly to improve jaw muscle and TMJ function and relieve pain related to dysfunction of those systems. The most common reason for bite splint prescription is, however, bruxism. To evaluate the possible role of occlusion in the etiology of TMD and jaw muscle dysfunction in patient examination, it is necessary to have a good understanding of functional jaw muscle and TMJ anatomy. Occlusion affects the way jaw muscles function, and jaw muscle function affects the way the TMJ functions. Therefore changes in the patient’s occlusion will at least sometimes have some effect on the jaw muscles and the TMJ structures. The effect can be direct by changing the relations between the intracapsular TMJ elements or indirect by affecting the muscles’ working conditions.

In extreme conditions changes in occlusion may lead to displacement and destruction of the TMJ disks. Occlusal interferences may thus cause internal TMJ derangement. However, internal derangements such as disk displacement may certainly be caused by a number of other factors, for instance trauma to the jaw. Such a displacement may change the occlusion and make it unstable with observable interferences.

There is, however, no general agreement about the role of interferences in TMD etiology. Nor is there a consensus about if and why splint treatment may have a beneficial effect. Some researchers have found that

about 80% of their patients received some benefit from splint therapy. Others claim that the only effect is placebo. With such a divergence in opinions about the value of splint treatment, it is understandable that no consensus has been reached about pros and cons of different designs.

Numerous variations in design, and explanations for its possible effect, have been published since Karolyi 1901 described his splint. It is difficult to prove or disprove the advantages of one type or another. There are often large discrepancies between the signs observed by the therapist and the symptoms described by the patients. Most of what we know about splint design and use is based on “clinical experience”. Still, the clinician should not hesitate in suggesting conservative splint treatment when he/she sees a reason for it.

Compared to most other treatment modalities, it is an inexpensive, non-invasive, reversible procedure which, according to most clinically experienced authors, has a high success rate.

A reasonable assumption seems to be that rigid rules for the design of a splint are less justified and that a splint, following a few basic principles, is well justified for the following purposes³³:

- To protect the teeth in bruxing patients.
- To protect the cheek and/or tongue in patients with oral parafunctions.
- To stabilize unstable occlusion.
- To promote jaw muscle relaxation in patients with stress related pain symptoms like tension headache and neck pain of muscular origin.
- To test the effect of changes in occlusion and vertical dimension on the TMJ and jaw muscle function before extensive restorative treatment.
- To eliminate the effect of occlusal interferences.

OBJECTIVE

The objective of this work is to compare the effect of acupuncture and occlusal splint in the treatment of temporomandibular disorders (TMD) in female patients.

MATERIAL AND METHOD

Forty-eight female patients (mean age of 39.3 ± 6.8 years) with diagnosed pain in muscles or joint according to RDC/TMD criteria were attended at UNESP - Aracatuba Dental School. Including criteria were reported pain in the chewing muscles and/or in the temporomandibular joint measured by a visual analogue scale (range from 0 to 10) and a reported reduction of the maximum mouth opening. Excluding factors were major occlusal problems, systemic diseases, pregnancy and age below 18 years. After randomization, the first group was treated with acupuncture performed by instructed dentist. The second group was treated with occlusal splint. The outcome variables were assessed at baseline (prior to the first treatment session) and after 1, 3 and 6 months. Primary criteria of success were improvement of mouth opening and pain reduction.

RESULTS AND DISCUSSION

Acupuncture group exhibited chewing pain decrease from 5 (at baseline) to 1, 2 and 1 after 1, 3 and 6 months, respectively. In the splint group, chewing pain decreased from 4 to 2, 1 and 2 after 1, 3 and 6 months, respectively. The mouth opening (in mm) increased from 28 (at baseline) to 42, 44 and 46 after 1, 3 and 6 months, respectively in the acupuncture group. In the splint group, mouth opening improved from 29 to 40 after 1 month, and to 43 and 42 after 3 and 6 months. A significant pain reduction was noted for both groups when compared to the baseline ($p < .001$; Wilcoxon test). Acupuncture group had a significant clinical improvement of opening mouth (Mann-Whitney).

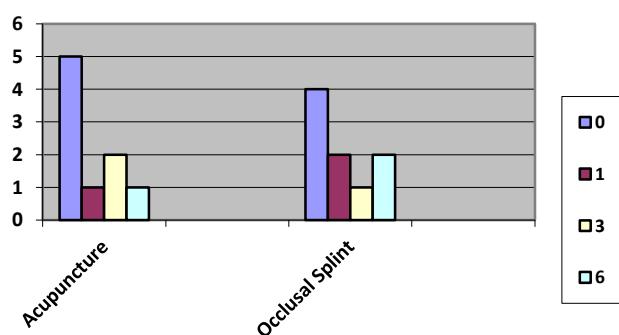


Figure 1 - Chewing pain after Acupuncture Therapy or Occlusal Splint Therapy (Visual Analog Scale)

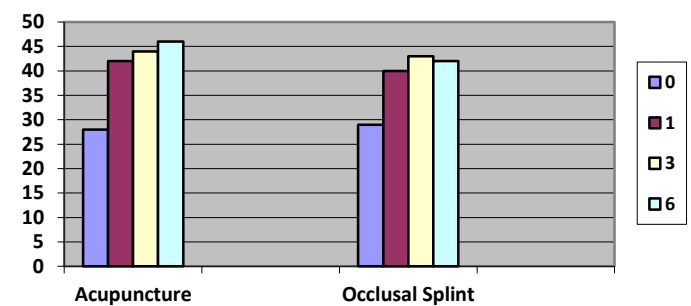


Figure 2 - Opening mouth after Acupuncture Therapy or Occlusal Splint Therapy (mm)

Occlusal splint therapy and acupuncture have been found to provide positive treatment in a number of studies. List and Helkimo³⁴ studied 61 patients with craniomandibular dysfunction (CMD) which were treated with acupuncture or occlusal splint therapy and the adverse events were carefully recorded. The results showed that the profile of the adverse events differed between the two treatment modes. Acupuncture seemed to have adverse events of a more general nature, e.g., relaxed feeling, improved sleep, temporarily increased pain; whereas, adverse events of occlusal splint therapy seemed to be more locally related to the orofacial region, e.g., increased/decreased salivation and tension in the teeth. The majority of the patients responded positively to both treatment modalities. Only in a few cases did the patients consider the treatment uncomfortable. No serious adverse event or complication was observed in this study. The application of acupuncture in patients with TMD part of principle that it is capable of reducing the activity of the masticatory muscles and control stress and anxiety. The advantage of acupuncture treatment is the possibility of being associated with conventional therapies.

This work intended study the effects of acupuncture at treatment of patients with temporomandibular disorders. The therapy with acupuncture reduced the pain and improved opening mouth.

CONCLUSION

The multifactorial etiology of TMD leads to the variety of treatment options. The present outcomes suggest a positive association among acupuncture and

occlusal splint on the reduction of chewing pain. Acupuncture was more effective in the mouth opening increase.

RESUMO

Objetivo: Comparar os efeitos da acupuntura e da placa oclusal no tratamento da DTM em mulheres. Método: 48 pacientes do gênero feminino (39,3 ± 6,8 anos), atendidas na Faculdade de Odontologia de Araçatuba/Unesp, com limitação de abertura bucal e dor orofacial diagnosticada com RDC e medida por escala analógica visual (0-10). Foram excluídas da amostra pacientes com problemas oclusais, doenças sistêmicas, gravidez e idade inferior a 18 anos. Após randomização, o primeiro grupo foi tratado com acupuntura (GI). O segundo, com placa oclusal (GII). As variáveis de desfecho foram avaliadas no início (antes da primeira sessão de tratamento) e após 1, 3 e 6 meses. Principais critérios de sucesso foram ampliação da abertura bucal e redução da dor. Resultado: GI exibiu redução de dor ao mastigar de 5 para 1, 2 e 1 após 1, 3 e 6 meses, respectivamente. Em GII, dor ao mastigar diminuiu de 4 para 2, 1 e 2 após 1, 3 e 6 meses, respectivamente. A abertura bucal (mm) aumentou de 28 para 42, 44 e 46 após a 1, 3 e 6 meses, respectivamente, em GI. Em GII a abertura bucal melhorou de 29 para 40, após 1 mês, e 43 e 42 após 3 e 6 meses. Redução significativa da dor foi observada em ambos os grupos ($p < 0,001$, teste de Wilcoxon). O grupo que recebeu acupuntura teve significativa melhora clínica de abertura bucal (Mann-Whitney). Conclusão: os resultados sugerem associação positiva entre placa oclusal e acupuntura na redução da dor orofacial. A acupuntura foi mais eficaz no aumento da abertura bucal.

Palavras chave: Oclusão Dentária; Dor; Músculos Mastigatórios; Terapêutica.

RESUMEN

Objetivo: Comparar el efecto de la acupuntura y la férula oclusal para el tratamiento de los trastornos temporomandibulares (TTM) en pacientes de sexo femenino. Método: Cuarenta y ocho pacientes de sexo femenino (edad media de 39,3 ± 6,8 años) con dolor diagnosticado en los músculos o articulaciones según RDC / fueron atendidos en la UNESP criterios TMD - Facultad de Odontología de Araçatuba. Incluyendo los criterios se informaron dolor en los músculos de la masticación y / o en la articulación temporomandibular medida mediante una escala analógica visual (rango de 0 a 10) y una reducción informado de la apertura máxima de la boca. Excluyendo factores fueron los principales problemas oclusales, enfermedades sistémicas, el embarazo y la edad menor de 18 años. Después de la

aleatorización, el primer grupo fue tratado con acupuntura realizada por el dentista le indique. El segundo grupo fue tratado con férula oclusal. Las variables de resultado se evaluaron al inicio (antes de la primera sesión de tratamiento) y después de 1, 3 y 6 meses. Criterios primarios de éxito fueron la mejoría de la apertura oral y la reducción del dolor.

Resultado: grupo de acupuntura mostró disminución del dolor de masticar a partir de 5 (en la línea base) a 1, 2 y 1 después de 1, 3 y 6 meses, respectivamente. En el grupo de férula, dolor de masticar se redujo de 4 a 2, 1 y 2 después de 1, 3 y 6 meses, respectivamente. La apertura de la boca (en mm) aumentó de 28 (en la línea base) a 42, 44 y 46 después de 1, 3 y 6 meses, respectivamente, en el grupo de acupuntura. En el grupo de férula, apertura de la boca mejoró 29 a 40 después de 1 mes, y para 43 y 42 después de 3 y 6 meses. Una reducción significativa del dolor se observó en ambos grupos en comparación con la línea de base ($p < 0,001$, prueba de Wilcoxon). Acupuntura grupo tuvo una mejoría clínica significativa de la apertura de la boca (Mann-Whitney). Conclusión: Los presentes resultados sugieren una asociación positiva entre la acupuntura y la férula oclusal en la reducción del dolor de masticar. La acupuntura fue más eficaz en el aumento de la apertura bucal.

Palabras clave: Oclusión Dental; Dolor; Músculos Masticadores; Terapêutica.

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