

Emotional stress evaluation in patients with temporomandibular joint disorder

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Abstract. The multifactorial etiology of temporomandibular joint disorder includes physiological/functional and psychological factors. Aim: This study aimed to evaluate the emotional stress status in patients with temporomandibular joint disorder. Materials and methods: Seventy-nine patients (DTM group n=37, control group n=42) were included in the study. Positive diagnosis of temporomandibular joint disorder was based on Research Diagnosis Criteria for Temporomandibular Joint Disorder. Questionnaires containing Beck Anxiety Index (21 items with 4 possible answers) were used to evaluate the level of emotional stress. Based on the total score patients were classified into 4 levels of anxiety: minimum (0-7), low (8-15), moderate (16-25) and severe (26-63). Results: A significant correlation was identified between age and presence of temporomandibular joint disorder ($p=0.028$). In younger subjects signs and symptoms of temporomandibular joint disorder were more frequent than in older patients. The presence and level of anxiety is linked to the signs and symptoms of temporomandibular joint disorder ($p<0.001$). Beck Anxiety Index values obtained in patients with temporomandibular joint disorder were significantly higher compared with values obtained from patients in the control group. Urban or rural residence does not influence the presence or level of anxiety and signs and symptoms of temporomandibular joint disorder. Conclusion: Anxiety is linked to temporomandibular joint disorder development.

Key Words: psychology, anxiety, temporomandibular joint, orofacial muscles.

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Introduction

Temporomandibular joint dysfunction is a complex of signs and symptoms that affect the masticatory muscles and/or temporomandibular joint. In general population the frequency of temporomandibular joint dysfunction is 5-12% (Poveda Roda et al 2007). The presence of pain is the primary characteristic of this condition and mechanisms of development can be correlated with joint and muscle structural abnormalities or dental occlusal disorders. Etiologic factors include certain psychological or behavior characteristics. Laskin was the first to suggest that the main factor responsible for the emergence and development of DTM is an emotional factor rather than a physiological one (Laskin 1969). Lately, numerous studies have focused on understanding the correlations between psychological stress and temporomandibular joint dysfunction (Grzesiak 1991; Kapel et al 1989).

Defined by Hans Selye as a “non-specific response of the body to the any demand for change” stress is not an unusual emotional force, is part of everyone’s experience and stress factors can be pleasant or unpleasant. Not all stress conditions are harmful to the body. Short-term low or moderate stress levels can be perceived as positive stimulating emotional and intellectual growth and development of the organism. The level of emotional stress depends on the amount and intensity of stress

factors that can vary even during the same day. The physiological tolerability refers to maximum level of a condition or activities performed by a person without any changes to the normal functional processes. This tolerance level varies from patient to patient, and in the same patient might vary throughout lifetime. It can be influenced by nutrition, general health, fatigue, age or mental state. These variations (not only in the same person but also between different individuals), explain why the severity of emotional stress does not directly influence in the same way the severity of symptoms or dysfunction degree in different patients (Selye 1977).

Stress affects parafunctional activities by the reticular system in the hypothalamus and in particular the limbic system that influences muscle activity. This influence is exerted by increased activity in intrafusal fibers that react producing reflex contractions to low stimulus activity. Most of the molecules involved in the mechanism of stress are the same as those associated with pain, so in stressful situations impaired perception of pain transmission is associated (Millan 2002).

De Leeuw et al consider that muscle dysfunction and associated pain are often the result of stress-induced muscle hyperactivity. Muscle dysfunction determined by stress can cause changes in the temporomandibular joint. Hyperactivity in elevator mandibular muscles increases intra-articular pressure and biomechanical

alterations of temporomandibular joint, with the result micro traumatic deterioration of the joint capsule and/or the attachment disc can develop (De Leeuw *et al* 1994).

The results of studies investigating psychological factors in the temporomandibular joint disorder etiology are not uniform. Some authors have identified increased electromyographic activity of the orofacial muscles in patients with temporomandibular joint disorder compared to the control group (Grzesiak 1991; Kapel *et al* 1989; Nishiyama *et al* 2012), while others found no correlation between signs and symptoms of temporomandibular joint disorder and the values recorded on electromyography. (De Leeuw *et al* 1994; Wexler *et al* 1998). Most authors consider that both physiological and psychological factors contribute to the emergence and development of temporomandibular joint disorder symptoms.

A causal relationship was previously identified between anxiety, muscle tension and temporomandibular joint disorder symptoms. High levels anxiety were found in 16.58% and in 26.71% of the subjects from a group of teenagers with signs and symptoms of temporomandibular joint disorder (Bonjardim *et al* 2005). In another study, 39.8% of patients with symptoms of temporomandibular joint disorder presented moderate and/or severe depression (Yap *et al* 2003).

The objective of this study was to assess the level of emotional stress in patients with temporomandibular joint disorder compared with those in the control group and establish a possible correlation between stress levels and the onset of pathology in the temporomandibular joint disorder.

Material and methods

A prospective, observational study was realized. Seventy-nine patients (DTM group $n=37$, control group $n=42$) addressing the Prosthodontics Department of our University were included in the study.

Temporomandibular joint disorder diagnosis was based on research diagnostic criteria for temporomandibular dysfunction (RDCTMD). In summary, patients with positive diagnosis of temporomandibular joint disorder presented simultaneously three criteria: pain with a significant frequency in orofacial region (cheeks, jaws, muscles, temporomandibular joint, temporal region) during the last 6 months (at least 15 days in the last month and at least 5 days per month in the previous period last month); orofacial pain at least 5 days in the last 30 days; pain in the masticatory muscles at least 3 or at least the temporomandibular joint during palpation or functional muscle or joint manipulation. Examiners defined orofacial region by bilateral palpation of the following anatomical areas: temporal, preauricular, masseter, posterior mandibular and submandibular. Chronic pain is defined as pain present for at least 6 months.

In order to analyze the level of emotional stress, evaluation questionnaires containing Beck Anxiety Index (BAI) were used. The questionnaire consists of 21 items regarding the patient's emotional status expressed through common anxiety symptoms (tingling, weakness, sweating ambient temperature undue fear of imminent harm). It is designed to patients aged between 17-80 years. Each question has the same four possible answers as follows: none (0 points), I felt a little but did not bother me (1 point), I felt moderately, it bothered me sometimes (2 points), severe, bothered me all the time (3 points). Total score allowed

the classification of patients into 4 levels of anxiety: minimum (0-7), low (8-15), moderate (16-25) and severe (26-63).

The statistical analysis was performed using MedCalc Statistical Software version 15.4 (MedCalc Software bvba, Ostend, Belgium; <https://www.medcalc.org>; 2015). Mann-Whitney test and chi-square test were used for the analysis of the data. The Cronbach's Alpha was calculated in order to evaluate the internal consistency of the questionnaire. A p value <0.05 was considered as significant.

Results

A significant correlation was identified between age and presence of temporomandibular joint disorder ($p=0.028$). In younger subjects signs and symptoms of temporomandibular joint disorder were more frequent than in older patients. The median age of temporomandibular joint disorder patients was 36 years (28; 52), in contrast with the patients in the control group where the median age was lower [32, (22.5; 43.5)].

The presence and level of anxiety is linked to the signs and symptoms of anxiety and temporomandibular joint disorder ($p<0.001$). BAI values obtained in patients with temporomandibular joint disorder were significantly higher [median 20 (11; 30)] compared with values obtained from patients in the control group [median 10 (6; 18)].

Female gender was predominant in patients with signs and symptoms of temporomandibular joint disorder ($n=22$; 59.5%), but no statistically valid correlation could be established ($p=1$). Fifteen examined patients (19%) were from rural areas and 64 (81%) from urban areas. Six patients (16.2%) from rural areas presented symptoms of temporomandibular joint disorder. The area of origin does not influence the occurrence of temporomandibular joint disorder signs and symptoms ($p=0.763$).

The analysis of interrelation between anxiety and age showed no statistical significance ($p=0.171$). The median age of patients with minimum anxiety level was 38 years old (28; 46), for low anxiety 27.5 years old (24.75; 43.25) for moderate anxiety, age 38 years (27.5; 52), and for the severe anxiety median age was 32.5 years (22.75; 61).

Of all the patients included in the study, most had a low level of anxiety ($n=18$; 38.3%), moderate ($n=10$; 21.3%) or severe ($n=10$; 21.3%) and to a lesser degree, the minimum anxiety level ($n=9$; 19.1%). The degree of anxiety most commonly presented by male patients was moderate ($n=14$; 43.8%), followed by low ($n=8$; 25%), minimum level for 6 patients (18.8%) and in the least severe level of anxiety ($n=4$; 12.5%).

For patients living in rural areas an even distribution of levels of anxiety was noticed, unlike those in urban areas where mostly low or moderate levels of anxiety were encountered. No statistically significant relation between environment (urban or rural) and level of anxiety could be established ($p=0.515$).

In order to assess the usefulness of the questionnaire applied (Beck Anxiety Index), internal consistency coefficient was determined. Cronbach's Alpha value was 0.915, thus confirming the high level of confidence of the questionnaire.

Discussions

Although most patients in our study diagnosed with temporomandibular joint disorder were females, no statistical significance

could be observed between gender and presence of this disorder or anxiety levels. Data reported in the literature present a significant interrelationship between female gender and the presence of signs and symptoms of temporomandibular joint disorder (Cimino *et al* 2000; Dao *et al* 2000; LeResche *et al* 2007). The levels of anxiety in patients with signs and symptoms of temporomandibular joint disorder were significantly higher than the values recorded in the control group. Similar results were obtained by Giannakopoulos in a study regarding the prevalence of anxiety and depression in subjects with temporomandibular dysfunction type I (muscle dysfunction), type III (joint dysfunction) comparing to healthy subjects in the control group. Anxiety scores were similar for the two groups with temporomandibular joint disorder and significantly higher than the control group (Giannakopoulos *et al* 2010). Bonjardim *et al.* recorded the psychological status in patients with temporomandibular joint disorder and observed that the severity of the dysfunction is directly proportional to the level of anxiety (Bonjardim *et al* 2005).

Urban or rural residence does not influence the presence or level of anxiety and signs and symptoms of temporomandibular joint disorder. The data obtained in our study are contrary to those presented by Goddard *et al* who evaluated 192 patients with temporomandibular joint disorder (102 in urban areas and 90 in rural areas). The results showed that patients in urban areas present significantly more often orofacial pain compared to those in rural areas (Goddard *et al* 2002).

The results of the current study indicate that age variations in the sample had significant effects on presence of signs and symptoms of temporomandibular joint disorder. These results are consistent with those presented by previous studies that evaluated the interrelationship between age and symptoms of temporomandibular joint disorder on a 920 subjects sample noting a significant reduction in symptoms with increased age (Salonen *et al* 1990) but contrasts with data obtained in other studies reporting either an increase in symptoms with age for sample of 2255 subjects (Nilsson *et al* 2007) or lack of a significant association between age and signs and symptoms of temporomandibular joint disorder, in a sample of 7008 subjects (Conti *et al* 1996). These variations in the results from different studies may be due to sample size or demographic distribution.

The study has several limitations. They refer to the sample size and heterogeneity. Inclusion in the study of a larger group of subjects would probably allow obtaining conclusive results on the interrelation between symptoms of temporomandibular joint disorder and anxiety level.

Conclusions

Psychological stress can be considered an etiologic factor of temporomandibular joint disorder. In most cases the psychological factors are associated with physiological/functional factors, so it is important to identify the degree of involvement of each, which will enable optimal treatment scheme for the improvement and elimination of temporomandibular joint disorder debilitating symptoms.

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