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Anxiety, Craniomandibular Disorders and Oral Jaw Habits

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Abstract:
Introduction: *The relationship between psychological factors, craniomandibular disorders and oral jaw habits is becoming more clear and has motivated increased research on the field.* ***Goals:*** *Evaluate the relationship between scores in anxiety and oral jaw habits in craniomandibular disorder individuals with oral jaw habits and jutting the jaw forward.* ***Methods:*** *Clinical examination, biomechanical tests, a set of questionnaires, including a questionnaire for oral jaw habits were used in 40 subjects with Craniomandibular Disorders and oral jaw habits including jutting the jaw forward, 40 Craniomandibular Disorder subjects presenting with oral jaw habits but without jutting the jaw forward and 40 no Craniomandibular Disorder subjects with oral jaw habits but without self-reported jutting the jaw forward. The Taylor Manifest Anxiety Scale was used to gather information about anxiety. Data was analyzed using the Kruskal-Wallis test (nonparametric) and Spearman (nonparametric) correlation coefficient.* ***Outcome:*** *Mean age in the Craniomandibular Disorders and Jutting the jaw forward subgroup was about 33,6 (SD=13,6, range=17-63); 40,0 (SD=13,2, range 18-75) in the Craniomandibular Disorders subgroup without jutting the jaw and 32,3 (SD=14,0, range=13-73) in the subgroup without CMDs and no jutting the jaw forward (Kruskal-Wallis statistics p=0,49). Mean anxiety scores were about 18,2 (SD=6,0, range=7—35) in the Craniomandibular Disorders and jutting the jaw forward subgroup; 16,9 (SD=5,4, range=9-39) in the Craniomandibular Disorders no jutting the jaw forward subgroup and 12,9 (SD=4,1, range=5-22) in the No Craniomandibular Disorders no Jutting the jaw forward subgroup (Kruskal-Wallis statistics p<0,0001): Craniomandibular Disorders and jutting the jaw forward subgroup versus Craniomandibular Disorders without jutting the jaw forward subgroup (p>0,05); Craniomandibular Disorders and jutting the jaw forward subgroup versus No Craniomandibular Disorders no jutting the jaw forward subgroup (p<0,001); Craniomandibular disorders no jutting the jaw forward subgroup versus No Craniomandibular Disorders no jutting the jaw forward subgroup (p<0,01). Mean scores in oral jaw habits were about 6,0 (SD=1,7, range=3-10); 3,9 (SD=1,9, range=0—8) and 3,3 (SD=2,6, range=0—9) in the Craniomandibular Disorder subgroup and jutting the jaw forward, in the Craniomandibular Disorders no jutting the jaw forward subgroup and in the No Craniomandibular Disorders no jutting the jaw forward subgroup, respectively: Kruskal-Wallis statistics (p<0,0001): Craniomandibular Disorders and jutting the jaw forward subgroup versus Craniomandibular Disorders no jutting the jaw forward subgroup (p<0,001); Craniomandibular Disorders and jutting the jaw forward subgroup versus No Craniomandibular Disorders and no jutting the jaw forward subgroup (p<0,001), Craniomandibular Disorders no jutting the jaw forward subgroup versus No Craniomandibular Disorders and no jutting the jaw forward subgroup (p>0,05). Potential correlations coefficients between scores in anxiety and number of oral jaw habits were also examined: Craniomandibular Disorders and jutting the jaw forward subgroup (Spearman rho=0,44, p<0,01); Craniomandibular Disorders and no jutting the jaw forward subgroup (Spearman rho=0,04, p=0,75), No Craniomandibular Disorders and no jutting the jaw forward subgroup (Spearman rho=-0,01, p=0,93).* ***Conclusion:*** *Craniomandibular Disorders subjects presenting with oral jaw habits including jutting the jaw forward demonstrated higher scores in anxiety and greater number of oral jaw habits as compared to the other two subgroups. There was a positive and significant correlation between scores in anxiety and number of oral jaw habits but only in the Craniomandibular Disorder and jutting the jaw forward subgroup.*

Keywords: *Craniomandibular Disorders. Oral Jaw habits. Anxiety. Jutting the jaw forward.*

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I. Introduction

Craniomandibular Disorders (CMDs) constitute a well defined set of musculoskeletal disorders related with pain and tenderness in the temporomandibular joints (TMJs) and adjacent musculoskeletal structures. Inflammation, swelling of the joints are usually influenced by both daytime and nighttime clenching and grinding the teeth[1]. CMDs constitute a set of clinical problems characterized by pain, joint noises, tenderness of the TMJs and masticatory muscles, abnormal jaw movements and sometimes headache[2]. **A number of Oral jaw habits (OJH)** has been studied in children including mouth breathing, tongue thrusting, finger biting, finger sucking and lip sucking. Some behaviors may occur independently but other can interact with another set of oral jaw habits[3] this increasing muscle activity in the masticatory region. OJH constitute oral motor behaviors that are repeated regularly, tend to occur unconsciously, they are considered common etiological agents for CMDs[4], and may lead to some secondary beneficial effect, for instance, decreasing anxiety and psychological discomfort.

Some destructive OJH including nail biting, chewing gums, tooth clenching and grinding and jutting the jaw forward are associated with the use of abnormal neuromuscular forces applied to the teeth, dental arches, bones and jaw muscles. It has been reported that there is a pathological association when parafuncional habits, stress and trauma occur concomitantly[1]. OJH contribute with muscular pain and CMDs[5] and most of them have been evaluated epidemiologically in children and adolescents although investigations in adults are very rare or nonexistent.

OJH usually occur in groups mostly in children and adolescents and include finger sucking, oral breathing, atypical swallowing, nail biting, diurnal and nocturnal bruxing behavior (BB), and thrusting the jaw forward[6]. Not all OJH are known in the dental profession as some of them remain hidden and are not reported by patients. Further, most patients present a combination of them.Thus some, may be observed in some patients but others not. Jutting the jaw forward is another OJH thought to be present in children and adolescents and is reported during the use of well designed questionnaires and consist of maintaining and or placing repetitively the lower jaw in an anterior or anterior and lateral position with or without tooth contact[7]. According to one investigation[8], thrusting the jaw is the act of forcefully moving or displacing the mandible in a forward and or lateral position causing strain and tension in the masticatory system and TMJs.

According to the literature of the last decades, sleep BB and other OJH are in some way influenced by social and psychological factors including stress, anxiety and psychological tension. Anxiety may be described as an unpleasant emotion characterized by worry, tension and fear[9] which occur frequently or occasionally superficially or very intense and is described by children, adolescents and adults.. Regarding sleep BB, it has been reported that sleep bruxers, have more stressed, are perfectionist and more aggressive than non bruxers[10]. Jutting the jaw forward may occur as an independent behavior or as a habit associated with other OJH including sleep BB in which case, the lower jaw is thrusted anteriorly and or anteriorly and laterally. Because OJH usually occur as a set of habits rather than as an independent behaviors, and sleep BB and daytime clenching have been associated with anxiety or stress[11], it follows that anxiety may also be observed in adolescent and adults reporting jutting the jaw forward. Because there is a paucity of clinical investigations in the study of the complex relationships between anxiety, oral jaw habits and internal derangements of the TMJs (TMJ-IDs), this study was designed to:

1.Evaluate scores in anxiety in subjects with CMDs, OJH and jutting the jaw forward and in those with CMDs, OJH no Jutting the jaw forward as compared to a control group of subjects with no CMDs, no OJH and no Jutting.

2.Compare means in OJH in the subgroup with CMDs, OJH and jutting the jaw forward, in the subgroup with CMDs, OJH no jutting the jaw forward and in the subgroup with No CMDs and no jutting the jaw forward.

2.Test the hypothesis that there is a significant correlation between scores in anxiety and OJH in subjects with CMDs, OJH including jutting the jaw forward and in those with CMDs, OJH and no jutting the jaw forward.

II. Material and Methods

Sample

During the last 18 years we have been evaluating CMDs and Orofacial Pain patients at a Medical and Dental Facility in the Department of Orofacial Pain, School of Dentistry University of Gurupi, TO, Brazil. The procedure to gather data in any patient referred to the department is described as follows: Use of clinical examination, history of the chief medical or dental complaint, biomechanical tests to evaluate CMDs and TMJ-IDs. Examiners also use palpation of the masticatory muscles and TMJs, self-report and clinical examination to asses and diagnose type and severity of diurnal and nocturnal BB. A set of questionnaires is also used to

gather information about OJH, headaches including its type and previous use of medication. Psychological tests are also used to gather information about anxiety (TMAS), depression (Beck Depression Inventory), hostility (Cook-Medley questionnaire) and other psychological disorders of clinical interest. The goal of this comprehensive evaluation is to obtain accurate, reliable and complete data to further investigate any variable of interest once sufficient data has been gathered. Once subjects are comprehensively evaluated, clinical records are stored in a database for future studies of many variables of interest, for instance, anxiety in CMDs and BB subjects. Patients are informed about the objectives and reasons for a comprehensive clinical evaluation, the scientific and clinical value of the medical records, their future use for research purposes, benefits for the society and science and the guarantee of anonymity for of all those evaluated in our facility.

In order to carry out the current investigation we used our database to retrieve the first 40 clinical records of subjects presenting with CMDs, OJH including jutting the jaw, 40 records form subjects presenting CMDs, OJH and no jutting the jaw forward (Control subgroup 1) and 40 records of those with no CMDs, "some" OJH, and no jutting the jaw forward (Control subgroup 2). Once the material was evaluated and separated we proceeded to form three study subgroups: CMDs + OJH + Jutting the jaw forward (n=40), CMDs + OJH and no Jutting the jaw forward (n=40) and No CMDs "some" OJH but no Jutting the jaw forward (n=40),

Criteria for CMDs: A complaint of pain in the mastictory system, seeking help for signs and symptoms at the time of examination, presence of joint noises, tenderness to palpation of the TMJs and some masticatory muscles, difficulties to perform normal jaw movements, headache of musculoskeletal origin.

Criteria for BB: At least three of the following: Self-report of catching himself or herself clenching the teeth during the day and/or at night, tongue indentations, friends, spouse or relatives´ report of observing the patient clenching or grinding during the day or night or producing sounds of grinding at night, hypertrophy of the masticatory muscles, waking up with pain in the masticatory system in the morning, a history of difficulties to open the mouth on awakening in the morning. Once the questionnaire and clinical examination for BB was completed, subjects were classified as no bruxers, daytime bruxers, nighttime bruxers and mixed bruxers.

Exclusion criteria: Subjects presenting with severe psychiatric or psychological disorders (for instance aggression, irritability), those with severe motor disorders (for instance any type of epilepsy or body movements), and those with severe cognitive disorders, implying difficulties to respond to questions and or to fill out a questionnaire were excluded from the study and the information obtained (clinical records) was not included in the database.

III. Measures

Because there are many self-reported items in the Taylor Manifest Anxiety Scale (TMAS), we selected only 32 questions of this questionnaire to assess the presence of anxiety in the current study. Items in this instrument are arranged in the form of a statements to which the subject responds with the words Yes or No. It takes about five minutes to respond properly to the 32 questions from the TMAS.

IV. Statistical analysis

Basic statistics (Mean, SD and Range), Kruskal-Wallis nonparametric statistics and Spearman correlation coefficient (nonparametric), were used to analyze data in the current investigation.

V. Outcome

This investigation evaluated a subgroup of 40 subjects with CMDs and OJH including jutting the jaw forward (mean age 33,6, SD=13,6, range=17-63), another subgroup of 40 subjects presenting with CMDs, OJH but no jutting the jaw forward (mean age 40,0, SD=13,2, range=18-75) and another subgroup of 40 subjects presenting no CMDs some OJH without jutting the jaw forward (mean age=32,3, SD=14,0, range 13-73). There were 37 females (92,5%) in the CMDs + Jutting the jaw forward subgroup; 39 females (97,5%) in the CMDs subgroup with no jutting the jaw forward and 28 females in the Control subgroup with no CMDs, some OJH but without jutting the jaw forward. Age was not significantly different when the subgroups were compared (Kruskal-Wallis statistics p=0,49).

Mean anxiety scores were about 18,2 (SD=6,0, range=7-35) in the CMDs, OJH and jutting the jaw forward subgroup, 16,9 (SD=5,4, range=9—39) in the CMDs some oral jaw habits without jutting the jaw forward and 12,9 (SD=4,1, range=5-22) in the No CMDs, some OJH and no jutting the jaw forward Control subgroup. Kruskal-Wallis statistics ($p<0,0001$): CMDs + jutting the jaw forward versus CMDs no jutting the jaw forward ($p>0,05$); CMDs + jutting the jaw forward versus No CMDs Controls without jutting the jaw forward ($p<0,001$); CMDs no jutting the jaw forward versus No CMDs no jutting the jaw forward ($p<0,01$).

Mean scores in OJH were about 6,0 (SD=1,7, range=3—10) in the CMDS + Jutting the jaw forward subgroup, 3,9 (SD=1,9, range=0—8) in the CMDs no jutting the jaw forward and 3,3 (SD=2,6, range=0—9) in the No CMDs no jutting the jaw forward subgroup. The difference was statistically significant (Kruskal-Wallis

statistics p<0,0001): CMDs + Jutting the jaw forward subgroup versus CMDs no jutting the jaw forward subgroup (p<0,001); CMDs + Jutting the jaw forward versus No CMDs no jutting the jaw forward subgroup (p<0,001); CMDs no jutting the jaw forward versus No CMDs no jutting the jaw forward Controls (p>0,05).

Because some researchers have indicated a potential relationship between anxiety and oral jaw habits, we thought that it would be of significant clinical value to evaluate a potential positive correlation between scores in anxiety and number of oral jaw habits. Because Spearman rho=0,44 (p<0,01) in the CMDs and Jutting the jaw forward, Spearman rho=0,04 (p=0,76) in the CMDs no jutting the jaw subgroup and Spearrman rho=-0,01 (p=0,93) in the No CMDs no jutting the jaw forward control subgroup, we can state that the correlation between anxiety and number of oral jaw habits was positively and significantly associated only in the CMDs, OJH and jutting the jaw forward subgroup.

VI. Discussion

CMDs subjects with or without a current history of jutting the jaw forward demonstrated higher scores in anxiety as compared to the control subgroup with no CMDs, some oral jaw habits and no jutting the jaw forward. The presence of jutting the jaw forward in CMDs subjects did not increase scores in anxiety relative to the subgroup with CMDs + OJH and no jutting the jaw forward. It is apparent that higher scores in anxiety are related to the presence of CMDs rather than to the presence of jutting the jaw forward. It may be that higher scores in anxiety are more likely to be associated with a greater number of oral jaw habits rather than to the presence of jutting the jaw forward. These considerations are in part consistent with one study[12] indicating that stress, anxiety and other psychosocial components may be a risk factor for BB, and thus for CMDs and other OJH as these behaviors negatively impact on the TMJs. Further, greater scores in anxiety are more likely to be associated with greater number of oral jaw habits and severer forms of BB. It has been reported that trait anxiety plays a role influencing the intensity and frequency of clenching episodes, as measured by EMG[13].

Higher scores in anxiety were not observed in all subjects demonstrating signs and symptoms of CMDs. This observation is congruent with one investigation[14] reporting that CMDs constitute a heterogeneous group of psychophysiological disorders commonly characterized by orofacial pain, chewing dysfunction or both. By heterogeneity we mean that some individuals may be burdened by anxiety , tension or depression and others not. Further, some CMDs cases are chronic, others are acute and even the number of OJH and scores in anxiety may vary among CMDs individuals. Because the CMDs subgroup demonstrating higher scores in anxiety was the one reporting higher number of OJH including thrusting the jaw forward, one is led to think that the relationship between anxiety, OJH, and CMDs is stronger as compared to other psychopathological relationships. It is also very likely that because the CMDs subgroup demonstrated a greater number of OJH resulting in more intense and frequent pain, these changes may have led to more frequent or intense anxiety as there is a relationship between pain, depression and anxiety. It may also be that some oral jaw behaviors are more deleterious to TMJs and that in some way contribute to higher levels of anxiety. Providing support for this point of view, one clinical investigation[15] reported that jaw play was the most detrimental oral jaw habit in adolescent girls[5]. Further support to such point of view comes from one investigation[15] reporting that OJH impose a very severe mechanical burden on the TMJs. Further, in one experimental investigation[16], higher frequency of gum chewing behavior resulted in higher prevalence of clicking and TMJ pain. We found that one subgroup of CMDs presenting with OJH including jutting the jaw forward demonstrated higher scores in anxiety. Such findings are in part consistent with one investigation[17] reporting that trait anxiety was significantly but weakly associated with the total score of OJH check list in women. A recent investigation[18] defends the notion that anxiety disorders are intrinsically related to painful CMDs. If so, once pain and dysfunction have become severe and chronic, they are very likely to cause anxiety, thus constituting an anxiety>>>>oral jaw behaviors>>>>>pain and dysfunction>>>>anxiety cycle.

The subgroup with CMDs + OJH and jutting the jaw forward demonstrated higher number of oral jaw habits as compared to the CMDs + OJH No jutting and to the No CMDs, s ome OJH and no Jutting. Thus, when jutting is reported in CMDs and BB individuals, it is very likely that such behavior are associated with greater number of other oral jaw habits. This subgroup was the one demonstrating higher scores in anxiety. It is very likely that because of the mechanical impact of these OJH this subgroup is the one demonstrating more frequent and severer pain, more severe TMJ internal derangements and higher levels of stress and anxiety. These findings are consistent with observations in another study[17] reporting that a unit increase in trait anxiety predicted an increase in the number of OJH. If stress, anxiety, depression and other personality traits exert important influence increasing frequency of parafuncional teeth contact[18], it follows, that the greater number of OJH present in a given individual, the more intense and frequent jaw muscle activity. Thus, such individuals are more likely to complain of more intense and frequent pain.

One investigation[19] reported that an increase in anxiety score corresponded to more severe CMDs. Such severity may be mediated in part by the presence of greater number of OJH or parafunctions. Findings in the current investigation are also in line with one investigation[20] pointing that increased stress and anxiety lead to increases in physiological reactivity and adverse OJH such as clenching, grinding and other OJH. Again, it follows that once we accept the negative biomechanical effects of increased loading on the masticatory muscles and TMJs, it seems more apparent that greater number of oral jaw habits are more likely to be destructive for muscles and joints.

The correlation between scores in oral jaw habits and anxiety was positively and significantly associated only in the CMDs, OJH and current history of jutting the jaw forward.

A positive and significant correlation was observed between higher scores in anxiety and greater number of OJH in the subgroup with CMDs and jutting the jaw forward. Thus, these findings are in line with many recent studies[20] indicating that stress and anxiety are directly associated with parafunctional behaviors, for instance, clenching. Further, stress and anxiety may cause increased muscle activity and facilitate the development of parafunctional habits, resulting in microtrauma to the weak TMJ structures[21]. Further support for the positive association between number of oral jaw habits and scores comes from one investigation[22] about oral parafunctions, personality traits and anxiety in adolescents reporting that oral parafunctions , state anxiety and depression are interrelated. Self-reported parafunctional habits are prevalent and are significantly associated with moderate to severe levels of anxiety and vary in people with different personality factors[23]. In student with CMDs, there is a positive correlation between oral jaw behaviors and scores in anxiety[24].

VII. Conclusion

In this investigation we report higher scores in anxiety, greater number of oral jaw habits and a positive and significant correlation in the subgroup presenting with CMDs, OJH and jutting the jaw forward as compared with the other two reference subgroups. Some limitations inherent in a cross sectional study should be recognized when we study cause and effect relationships. Thus, further studies with similar but larger samples are highly recommended to increase the reliability related to findings in the current study.

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Table 1: Social and Demographic data in CMDs subjects with oral jaw habits and jutting the jaw forward (n=40), CMDs subjects with oral jaw habits and no jutting the jaw forward and controls non CMDs and no BB.

	CMDs+Jutting n=40	CMDs no Jutting n=40	No CMDs n=40
AGE			
Mean	33,6	40,0	32,3*
SD	13,6	13,2	14,0
Range	17—63	18—75	13—73
GENRE			
Females	37= 92,5%	39=97,5%	28=70%
Males	3= 7,5%	1= 2,5%	12=30%
Totals	40=100%	40-100%	40=100%

*Kruskal-Wallis nonparametric statistics (=0,49), a statistically nonsignificant difference.

Table 2: Means in anxiety and OJH in the subgroups CMDs + OJH + Jutting the jaw forward (n=40), CMDs + OJH and no jutting the jaw forward (n=40) and No CMDs No OJH and No Jutting the jaw forward (n=40).

	CMDs + OJH + Jutting=40	CMDs + OJH No Jutting=40	No CMDS No jutting=40
ANXIETY			
Mean	18,2	16,9	12,9*
SD	6,0	5,4	4,1
Range	7—35	9—39	5—22
ORAL JAW HABITS			
Mean	6,0	3,9	3,3**
SD	1,7	1,9	2,6
Range	3—10	0—8	0—9

*Kruskal-Wallis nonparametric statistics (p<0,0001), an extremely significant difference:: CMDs +Jutting versus CMDs no Jutting (p>0,05); CMDs + Jutting versus Controls (p<0,001); CMDs no Jutting versus No CMDs no Jutting (p<0,01).

**Kruskal-Wallis nonparametric statistics (p<0,0001), an extremely significant difference: CMDs + Jutting versus CMDs no Jutting (p<0,001); CMDs + Jutting versus No CMDs No jutting (p<0,001); CMDs no Jutting versus No CMDs No jutting (p>0,05).

Table 3: Spearman correlations coefficients between scores in Oral Jaw Habits and anxiety.

	CMDs Jutting=40	CMDs No Jutting=40	No CMDs No Jutting=40
SPEARMAN RHO	0,44	O,04	-0,01
p-value	<0,01	0,76	0,93

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