Artigo Original

Depression, pain, and site: a clinical comparison study in mild, moderate, severe and extreme bruxers

Depressão, dor e local: uma avaliação clínica comparativa em bruxômanos leves, moderados, severos e extremos

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SUMMARY

Objective: To assess the level of depression, severity of pain and pain in single/multiple sites in patients with different severity of bruxing behavior and Temporomandibular Disorders (TMDs). **Methods:** We evaluated 131 patients with bruxism and TMDs: 20 patients with mild bruxism, 42 patients with moderate bruxism, 45 patients with severe bruxism and 24 patients with extreme bruxism. We used the Beck Depression Inventory (BDI), clinical examination, a questionnaire of clinical epidemiological data, criteria for TMDs and bruxism, palpation of muscles and joints, the Visual Analogue Scale for pain, classification of the occlusion and biomechanical tests to assess for internal joint derangements. **Results:** The level of depression increased from the mild, to the moderate, severe and extreme bruxing behavior groups, but the difference was significant only from the mild to the extreme group ($p<0.001$). Pain levels increased from the mild and moderate to the severe and extreme subgroups, but were not statistically significant. Mean number of pain sites increased from the mild, to the moderate, severe and extreme subgroup and the difference was extremely significant ($p<0.0001$). **Conclusion:** Levels of depression, severity of pain and pain sites increased with severity of bruxing behavior. A higher number of pain sites with more severe bruxism indicates somatization in bruxers, but a further study using the same protocol and a psychological test for somatization would be indicated to further substantiate these findings.

Keywords: Temporomandibular Joint Disorders, Bruxism, Depression.

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RESUMO

Objetivo: Avaliar o nível de depressão, severidade da dor e dor em locais únicos e múltiplos em pacientes com diversos graus de bruxismo e Distúrbios Temporomandibulares (DTMs). **Método:** Nós avaliamos 131 pacientes com bruxismo e DTMs: 20 pacientes com bruxismo leve, 42 com bruxismo moderado, 45 com bruxismo severo e 24 com bruxismo extremo. Nos usamos o Questionário de Depressão de Beck, exame clínico, um questionário para dados epidemiológicos, critérios para Distúrbios Temporomandibulares e bruxismo, palpação dos músculos e articulações, a escala análoga visual para avaliar dor, classificação da oclusão e testes biomecânicos para avaliar distúrbios internos articulares. **Resultados:** O nível de depressão aumentou do grupo leve para o moderado, severo e extremo de pacientes com bruxismo, mas a diferença foi significante somente do grupo leve para o extremo ($p<0.001$). O nível de dor aumentou dos grupos leve e moderado para o severo e extremo, mas a diferença não foi significante. O número médio de locais com dor aumentou do grupo leve para os grupos moderado, severo e extremo e a diferença foi estatística e extremamente significante ($p<0.0001$). **Conclusão:** Os níveis de depressão, severidade da dor e locais com dor aumentaram com a severidade do bruxismo. Um número maior de locais com dor foi observado a medida que aumentou a severidade do bruxismo. Isto pode indicar somatização nesses pacientes, mas um estudo adicional usando o mesmo protocolo e um teste psicológico para somatização seria indicado para substanciar adicionalmente estes achados.

Unitermos: Transtornos da Articulação Temporomandibular, Bruxismo, Depressão.

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INTRODUCTION

Parafunctional masticatory activity includes nonproductive diurnal and nocturnal clenching or grinding of the teeth (bruxism) generally believed to have deleterious effects on the masticatory system[1]. The literature is replete with numerous reports implicating parafunctional activity as having a significant role in the cause of Temporomandibular Disorders. The effects of nocturnal bruxism on Temporomandibular Disorders (TMDs) are based on a habit that can cause significant damage to every part of the masticatory apparatus[2]. The etiology of bruxing behavior is to a great part unknown and controversial and many theories have been developed. It has been contended that psychological factors and stress play a major role in promoting and perpetuating the parafunctional habit[3]. Bruxism was defined as an anxiety response to environmental stress[4].

Many attempts have been made to find special personality characteristics for bruxism. However, there was no difference in personality features between bruxers and nonbruxers, suggesting that bruxers appear to be relatively normal in psychometric measures[5]. On the other hand, that will be because some relationships between psychological factors and bruxism are not clearly defined6, and more research about the link between hostility, bruxism, and depression is mandatory.

Review of the literature

Different levels of bruxing behavior

Many studies delineating the clinical and psychological features of Temporomandibular Disorders and bruxing behavior patients have been carried out resulting in the observation that different levels of bruxing behavior and heterogeneous populations of those patients do exist. A complete set of psychological tests to assess (the most severe cases) bruxing behavior/TMDs and based on the clinical/psychological characteristics, reported that bruxers could be classified in strain and nonstrain individuals[7]. Electromyography used in the temporal and masseter muscles reported that TMD and bruxing behavior patients could be classified as presenting "light" and "heavy" bruxing behavior[8]. They also found that more numerous and severe symptoms could be observed in the "heavy group" as compared to the "light" bruxing behavior group. A group of bruxers and a group of myofascial pain dysfunction syndrome showed a striking contrast in the level of pain experienced by both subgroups of patients[9].

Additionally, differential treatment responses of Temporomandibular Disorder patients (TMDs) suggesting that subgroups of those patients may exist based on differences in psychosocial and behavioral features which may be important when designing and evaluating treatments[10]. Those patients could be classified as dysfunctional, interpersonally distressed and adaptive copers. Bruxism could be classified in "frequent and non frequent" when personality traits were assessed in a group of subjects with long-standing bruxing behavior[11]. Finally, mild, moderate and severe bruxers reported hostility as the independent variable, bruxers could be classified as presenting minimal-mild and moderate-severe depression[12].

Depression

Depression is a complex psychobiological syndrome involving somatic, vegetative, cognitive, and affective disturbances. The importance of depression in clinical practice is that it can be a mediator between chronic pain and somatic complaint[13]. Depression may refer to either an affect, a symptom or even to a syndrome[14]. A number of studies assessing psychological states in TMD patients have been carried out. For instance, TMD patients with pain and illness behavior were more likely to display affective disorders including anxiety and depression[15].

Clinical depression in such patients is observed less frequently as compared to anxiety, but when depression occurs, it is always correlated with anxiety. Most TMD patients are characterized by musculoskeletal symptoms and depressive symptoms predicted the development of musculoskeletal pain in the general population[16]. Such finding indicated that pain could be a somatic manifestation of depression suggesting that not all TMD patients develop depression. Only a portion of TMD patients assessed was clinically depressed. It may be those different subgroups of TMDs presenting no depression, mild, moderate and severe levels of depression[17]. Such characteristics may be related to the level of TMD, severity of bruxing behavior and other less known psychosocial factors. This observation is supported because only two subgroups of bruxers/TMD patients presented clinical symptoms and signs of depression[18].

Severity of pain

Diurnal bruxing behavior involves repetitive isometric muscle contraction, but sleep related bruxism involves both chewing-like movements and long periods of isotonic contraction of the jaw muscles usually bilateral displaying maximal contraction forces with such a duration that may produce fatigue and pain. It has been reported that different subgroups of bruxing behaviors patient do exist and bruxing behavior in a destructive group may be related to differences in the clinical complaints including pain[18].

It is believed that some psychological characteristics of temporomandibular disorders and bruxing behavior patients including anxiety and depression may influence the severity, duration and frequency of pain. Because some of those patients score higher on the hypochondriasis and depression scales, it is very likely that they present with more severe pain[19]. Some subgroups of bruxers including those referred to tertiary center for diagnosis and treatment form the most severe cases that have not found relief to their pain at private dentists[7]. It may be that some subgroups of Temporomandibular Disorders and bruxing behavior patients are burdened with some specific psychiatric problems[20] as they report different levels of pain. This point of view is challenged by one investigation[21], reporting that pain intensity showed a strong correlation to scores of quality of life but not to psychological states. Pain intensity may first disrupt a patient's daily life and then impaired physical functioning would increase the level of anxiety and depression.

In acute TMD patients, reported that women who developed chronic TMD had significantly higher scores on graded pain severity indicating greater pain/disability, depression and non-specific physical symptoms. Such symptoms were not observed in women who did not develop chronic TMD complaints[22].

Pain in single and multiple sites

Pain in adjacent and distant anatomic areas to the stomatognathic system has been a field of intense clinical research in the last few years. Researchers have attempted to find a possible correlation between pain in local and distant anatomic areas and psychological states, TMD, and bruxing behavior. The latter disorder has also been defined as a psychosomatic one. A subgroup of bruxers presented with severe pain and multiple symptoms in the masticatory system but this subgroup was formed by the most severe cases of TMD and bruxing behavior[18]. It may be that such patients presented an increased muscle activity that generated muscle tension, muscle spasm and pain. Bruxers reported jaw pain, neck and shoulder pain, headache, and 60% dental pain[23]. Pain experienced by bruxing behavior patients may be analogous to pain/discomfort induced by excessive loading[24]. Furthermore, occasional or fluctuating pain reported by bruxers and TMD patients occurred concomitantly with increased periods of EMG activity[24]. TMD patients presenting with more frequent bruxing behavior reported higher prevalence of jaw, facial, head, neck, back, throat and shoulder pain as compared to "less frequent bruxing behavior", but a correlation with psychological states was not established[11].

Bruxism and depression

Many studies correlating bruxing behavior with psychological states including anxiety and depression have been carried out. Bruxing behavior patients, assessed by the Maudsley Personality Inventory, presented more depressive symptoms than nonbruxers[25].

Bruxers were also more emotionally unstable as compared to the control group. Karolinska Scales of Personality assessed anxiety and inhibition of aggression, in more frequent and less frequent bruxing behavior patients[11]. They reported that chronic bruxers themselves are more anxiety prone, and thus, may present higher values at the inhibition of aggression scale. Finally, bruxing behavior and Myofascial Pain Dysfunction patients

were evaluated and 10.5% of all bruxers described themselves as depressed[9]. Levels of depression have been assessed in TMD and bruxing behavior patients. However, subgroups of bruxers have not been evaluated regarding some psychological states, severity of pain and pain in single and multiple sites.

The objectives of this study are to evaluate levels of depression in subgroups of bruxers and TMD patients; to assess the severity of pain in the same subgroups and to study differences in pain in single and multiple sites in such subgroups.

METHODS

Data for this research were gathered retrospectively from131 TMD and bruxing behavior cases referred consecutively to a Center for the Study of those disorders in the years 2004-2006 to the University of Gurupi, Dental School (Gurupi, Tocantins).

Patients were classified as presenting TMDs if they demonstrated specific signs/symptoms including a complaint of pain in the masticatory muscles, noises in the temporomandibular joint, difficulties to perform lateral or opening jaw movements, tenderness in the masticatory muscles during palpation and headaches usually of muscle origin.

Mild, moderate, severe and, extreme bruxers were those presenting [3-5, 6-10, 11-15] and [16-24] of the following signs and symptoms accepted in the current literature: catching himself/herself clenching the teeth during the day, fatigue on the masseter muscles during the day, fatigue on the masseter muscles on awakening, a feeling of tension on the masseter muscles on awakening and/or during the day, a history of catching himself/herself grinding the teeth at night, jaws locked on awakening at night, wear facets of the teeth, head pain, masseter pain or TMJ pain on awakening, pain in the teeth on awakening in the morning, dental pain during the day, tooth sensitivity to cold, hypertrophy of the masseter/temporalis muscles, frequent fracture of teeth or restorations, body fatigue on awakening, cervical pain on awakening, a feeling of being tired or sleepless during the day, cheek biting, tongue biting, bone hypertrophy (maxilla or mandible), torus in the upper or lower jaw, jaw opening difficulties on awakening and previous use of an occlusal splint.

Of those 131 patients evaluated [20, 42, 45] and [24] demonstrated mild, moderate, severe, and extreme bruxing behavior respectively. A diversity of signs/symptoms of TMD was also present in those patients. They were not assessed exclusively for research purposes, but as part of the initial evaluation for potential diagnosis and treatment.

Because the assessment was comprehensive, such approach benefited both professional and patient, regarding diagnosis/treatment. The procedures as follows were used to gather clinical, psychological and diagnostic data: clinical examination of joint, muscles and jaw movements, the Visual Analogue Scale to gather subjective scores about pain, history of signs/symptoms including location, severity, chronicity and clinical characteristics of the pain, two questionnaires to assess presence and severity of bruxing behavior and oral jaw habits, biomechanical tests to evaluate for internal joint derangement, classification of the occlusion, criteria published in the literature to include patients as presenting or not Temporomandibular Disorders and the Beck Depression Inventory to assess depression.

The Visual Analogue Scale from 0 to 10 was used to assess severity of pain. Mild pain was considered as such if the patient reported that severity of pain was between 1-3, moderate pain if it was considered to be between 4 and 7 and intense pain when severity was between 8 and 10 in such scale.

The Beck Depression Inventory (BDI) is a robust psychological instrument having 21 self-rating items that measures depression. Each item in the instrument (for instance, pessimism), has phrases ordered by the level of severity: (0-3) and the patient is instructed to identify and record the phrase that more accurately describes his/her feelings or actual state. The instrument yields values ranging from 0 (no depression at all) to 63 (the maximal depressive state).

A short questionnaire was used to record pain in adjacent sites (mouth, teeth, head, temporomandibular joint, ear, neck, masticatory muscles) and distant sites (back, stomach, leg, feet and others). If pain in any site included in the questionnaire was considered as a complaint by the patient, then it was recorded as such. Because bruxing behavior is considered by some as a somatization disorder, recording pain in single and multiple sites is particularly relevant.

Following the use of these instruments, patients were grouped as presenting or not TMD and mild, moderate, severe and extreme bruxing behavior. Criteria for inclusion in any of these four subgroups were published previously[26]. Briefly, TMD patients were included as presenting such disorders if they demonstrated at least two of the following signs/symptoms: A complaint of pain, difficulties to perform normal jaw movements, tenderness to palpation of the masticatory muscles, joint noises and headaches. Complaints of pain and difficulties to perform functional jaw movements were usually most common.

Regarding criteria for bruxing behavior, a patient presenting 3-5 signs/symptoms was included as mild bruxer, a patient demonstrating 6-10 sign or symptoms was included as a moderate bruxer, a patient exhibiting 11-15 signs or symptom was classified as a severe bru-

xer and a patient presenting with 16 or more signs and/or symptoms was classified as presenting extreme bruxing behavior according to the list of signs and symptoms of bruxing behavior described previously in this section. We did not use criteria for the severity of TMD.

Statistical analysis

We used parametric/non parametric ANOVA, Kruskal-Wallis, and Pearson Product Moment Correlation Coefficient to test the significance of data observed in different subgroups.

RESULTS

There were 117 females (89.31%) and 14 males (10.69%) in the TMD and bruxing behavior group (Table 1). The mean age was about 33.26 years in the whole group, 33.66, 32.13, 33.80, and 33.45 years in the mild, moderate, severe, and extreme groups of bruxers and TMD patients. The mean BDI score was about 11.54 in the whole sample, 6.65, 10.78, 11.73, and 16.62 in the mild, moderate, severe, and extreme groups of bruxers and TMD patients (Table 2). The difference in the level of depression was statistically and significantly different only from the extreme to the mild bruxing behavior group. There was no statistical difference between the mild, moderate and severe groups of bruxers and temporomandibular disorder patients.

The mean severity of pain in the whole group of TMD and bruxing behavior patients was about 4.95, and 4.95, 5.88, 6.38, and 6.17 in the mild, moderate, severe, and extreme groups of bruxers and TMDs patients respectively (Table 3), but there was no difference in these groups ($p=0.08$). The mean numbers of pain sites were about 5.70, 3.90, 5.16, 6.02, and 7.54 in the whole group of TMD patients, mild, moderate, severe, and extreme groups of those patients respectively (Table 4). Using Kruskal-Wallis nonparametric test we found a statistically and extremely significant difference ($p<0.0001$) in such groups: mild bruxers vs. severe bruxers ($p<0.05$), mild bruxers vs. extreme bruxers ($p<0.001$), moderate bruxers vs. extreme bruxers ($p<0.001$). We found that the pair of variables level of bruxism-depression (r:0.33, $p<0.0001$), severity of pain-depression (r:0.27, $p<0.0019$), number of painful sites-level of pain (r:0.30, $p<0.0004$) and level of bruxism–painful sites (r:0.39, $p>0.0001$) were all positively and significantly correlated (Table 5). Of all pairs of variables evaluated, level of bruxism-painful sites was the most positively correlated (Table 5).

DISCUSSION

Mean Age

The mean age in the whole group of patients presenting TMD and bruxing behavior was about 33.26 years. Such mean was very similar as compared with

Table 1. *Demographic data and prevalence of severity of bruxing behavior in Temporomandibular Disorders and bruxing behavior patients.*

	All TMD and bruxers (131)	Bruxing types			
		Mild (20)	Moderate (42)	Severe (45)	Extreme (24)
Females	117(89.3)	16(80)	35(83.3)	43(95.5)	23(95.8)
Males	14(10.7)	04(20)	07(16.7)	02(4.7)	01(4.3)
Mean age	33.3±10.8	33.7±10.3	32.1±11.3	33.8±9.5	33.4±11.0
Range	14-67	16-54	16-67	14-60	14-55

Values in n (percentage); mean ± standard deviation; range = minimum-maximum.

Table 2. *Mean in the Beck Depression Inventory in the whole Temporomandibular Disorders group and bruxing behavior and in the Temporomandibular Disorders /bruxing behavior subgroups.*

	All TMD and bruxers (131)	Bruxers by subgroups			
		Mild(20)	Moderate(42)	Severe(45)	Extreme(24)
mean	11.5	6.6	10.8	11.7	16.6*
SD	8.5	6.4	8.4	7.4	9.6
range	0-42	0-42	0-2	0-28	2-36

*SD=Standard Deviation; Kruskal-Wallis Test $p<0.0028$; * $p<0.001$, comparing mild versus extreme group.*

Table 3. *Severity of pain in subgroups and in the whole group of bruxers and Temporomandibular Disorders patients.*

	All TMD and bruxers (131)	Bruxers by subgroups			
		Mild(20)	Moderate(42)	Severe(45)	Extreme(24)
severity of pain	4.9 2.9	4.9 2.9	5.9 2.1	6.4 1.7	6.2 1.2
range	4.2-8.5	0-9	2-10	0-10	4.2-8.5

Kruskal-Wallis Test: p=0.08; Values in mean ± standard deviation; range = minimum-maximum.

Table 4. *Mean number of painful sites in subgroups of Temporomandibular disorders patients.*

	All TMD and bruxers (131)	Bruxers by subgroups			
		Mild(20)	Moderate(42)	Severe(45)	Extreme(24)
mean	5.7	3.9	5.2*	6.0**	7.5***
SD	2.7	2.2	2.9	2.3	1.8
range	0-7	0-7	0-12	0-10	5-14

Kruskal–Wallis test: p<0.0001; * Moderate bruxers vs extreme bruxers = p<0.001; ** Mild bruxer vs severe bruxers =p<0.05; *** Mild bruxers vs extreme bruxers=p<0.001.

Table 5. *Coefficients of Pearson for specific variables.*

Pair of variables	Pearson r	p value
Level of bruxism and depression	r:0.33	p<0.0001
Severity pain and depression	r:0.27	p<0.0019
Pain sites and level of pain	r: 0.30	p<0.0004
Level of bruxism and painful sites	r: 0.39	p<0.0001

the mean age of 34 years observed in the group of bruxing behavior patients assessed in one study[27]. The mean age we observed was different as compared to the mean of 37.7 years observed in the literature[11], but these researchers assessed only "long-standing bruxing behavior patients" as compared to consecutive referrals in our study. Mean age found in our group was also different when compared to the mean age of about 27.7 years observed in other investigation[9]. It is very likely that such difference can be explained by the sample size as those researchers examined only 19 bruxers and TMD patients.

Scores in depression

The mean BDI score in the whole sample of 131 TMD and bruxing behavior patients was about 11.54. Depression scores increased with the severity of bruxing behavior. However, there was no statistically significant difference between the moderate, severe and extreme groups of bruxing behavior patients. The only significant difference observed was from the extreme to the mild bruxing behavior group ($p<0.001$, very significant). Even though values in depression increased with the severity of bruxing behavior, but were only different from the mild to the extreme group of bruxing behavior, the results of this study are supported by one research[27] observing a mean in the BDI of about 12.95 in 20 patients presenting with bruxing behavior. Because many patients demonstrated low levels of depression or no depression at all, the results of this study are supported at least in part by one investigation in bruxers[9], reporting that only 10.50% of those patients admitted to feel depressed. It may be that only those patients feeling moderate or high levels of depression report such symptom/disorder. Because we found that many TMD/bruxing behavior patients presented increased scores in depression that were high in only a few, the results of our investigation are supported by one study[17], indicating that "although no definitive psychological profile" has been observed, small elevations in anxiety, depression, and somatization, have been consistently identified in TMD patients". Regarding the relationship between more severe forms of bruxing behavior/depression, the results of our study are supported by another investigation[18], in which although researchers did not use the BDI and the sample was very small, they reported signs of depression in all female patients in the group of destructive bruxers. Interesting to note is that if we had not included the group of extreme bruxing behavior in this study, we would not have been able to

detect a group presenting the highest scores in anxiety and depression, as compared to the other groups.

We emphasize that a significant difference in depression was observed only when we compared the extreme group with the mild one. Further studies should review other psychological features of this extreme group of bruxers. It may be that such group is the most complicated both clinically and psychologically.

Aggression/frustration in this group may be converted in aggression inward (depression) represented by more severe bruxing behavior. In one study[27], researchers defended the notion that in depression, the tendency to exteriors aggressivity is denied or suppressed. Thus, hostile or aggressive feelings about other meanings are not accepted in the conscience, as they would produce painful guilt feelings.

Severity of pain

The mean pain score in the whole group of 131 bruxers and TMD patients was about 4.95. Pain intensity increased from the mild to the severe, but decreased non-significantly in the extreme bruxing behavior group. There was no statistical difference in the levels of pain between the different pain bruxing behavior groups. Mean pain level was considered moderate based on values on the visual analogue scale. Higher scores in pain were found among those patients presenting severe and extreme bruxing behavior. A small group of destructive bruxers was similar to those patients in our severe and extreme groups[18]. Because those patients reported severe muscle and temporomandibular joint pain, such study provide additional support to the results in our investigation. Because we observed different levels of pain in different groups of bruxers and TMD patients, one study demonstrating that pain was more intense in bruxing behavior patients as compared to myofascial pain patients[9] substantiates our investigation. To further elucidate this question, a study comparing intensity of pain in bruxers with and without myofascial pain should be carried out.

Sleep quality and clinical and psychological characteristics in TMD patients and reported a mean score in pain of about 6.35 which is not very different from the mean of 4.95 we report in the current investigation[28].

Mean number of painful sites

The mean number of pain sites in the group of 131 TMD and bruxing behavior patients was about 5.70. Number of pain sites increased from the mild (3.90) to the moderate (5.16), severe (6.02) and extreme (7.54) groups of bruxers respectively. There was an extremely significant difference ($p<0.0001$) among these groups. The significant differences were between the mild versus severe group ($p<0.05$), between the mild and the extreme group ($p<0.001$) and between the moderate and extreme group of bruxers ($p<0.001$). The extreme group demonstrated the greatest number of painful sites. The results of this study are in accordance with literature[18] about "destructive bruxers", presenting diffuse patterns of pain in the face, head, temporomandibular joint, neck, back and shoulders. In TMD patients reporting that severely depressed patients had a significantly greater number of painful muscle palpation sites than normal patients[29]. Pain reported by our patients occurred mainly in the musculoskeletal system. It may be that those severe/extreme bruxing behavior patients are more somatic and therefore have a tendency to report pain in multiple sites.

Severe and extreme groups of bruxers demonstrated higher levels of pain. It may be that high intensity pain itself is more sensitizing and promote increased vigilance about physical well being, lowering the threshold either for detecting physical sensations or for describing them as distressing or painful[30]. Multiple pain conditions are common in the population and the presence of multiple chronic pain symptoms is associated with elevated levels of anxiety and depression[31].

Positive correlation between variables of interest

We found positive and statistically significant correlations between severity of bruxism and depression, severity of pain and depression, number of painful sites and level of pain and severity of bruxism and number of painful sites. The strongest correlation was between level of bruxism and painful sites ($r:0.39$, $p<0.0001$). The results of this correlation study indicated that intensity of perceived pain and psychological distress are closely associated[28]. More frequent and less frequent bruxers compared with a normal population indicated that bruxers were more vulnerable to psychosomatic disorders[11]. It may be that the more severe the bruxing behavior, more somatization as a psychological disorder and thus, there is more likelihood of pain in multiple sites. A small sample of destructive and bruxers suggested that those presenting with more severe bruxing behavior could present a higher level of depression[18]. Finally, patients presenting multiple pain conditions (not TMD or bruxers), demonstrated a positive correlation with multiple pains and pain dysfunction, thus providing partial support for the findings in our investigation[31].

We found a higher level of depression, more severe pain, and higher number of painful sites in the severe and extreme subgroups of bruxers. Regarding some correlation of interest, all of them were positive and significant. The strongest correlation was between the level of bruxism and number of pain sites. This finding implicates somatization, as a major component of bruxing behavior, but further studies using a test for

somatization in bruxers and controls, should be carried out. Even though we introduced a gradient in the severity of bruxism (mild-moderate-severe-extreme) which is epidemiological sound and strengthens findings in our study, such results should be examined with caution as this was a cross-sectional study, thus cause and effect relationships cannot be inferred.

CONCLUSION

Based on the results of this study we conclude that the level of depression was higher, pain was more intense and the number of painful sites was also higher in more severe bruxers. Using correlation analysis, we found that the strongest positive correlation was between severity of bruxism and number of painful sites.

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