

## Awakening with Headache In Sleep, Diurnalbruxers And Controls Without Bruxing Behavior.

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### Abstract:

**Introduction:** Bruxing behavior is an oral phenomenon characterized by grinding and/or clenching the teeth at night and/or during the day. Sleep and diurnal bruxism cause many signs and symptoms in the teeth, alveolar bone, periodontal membrane, temporomandibular joints and masticatory muscles. Headache pain is reported more frequently in nocturnalbruxers and is a manifestation of stronger masticatory forces applied on the teeth.

**Aim:** Study the frequencies of sleep bruxism and morning awakening with headache in bruxers; assess whether pain can be distributed over a wider anatomic area in sleepbruxers.

**Methods:** We conducted a clinical retrospective study in bruxerswith or without temporomandibular disorder in which 105 demonstrated sleep bruxism andtemporomandibular disorders and43 diurnal bruxism and temporomandibular disorders. History of signs and symptoms, use of questionnaires and clinical examinationwere carried out to gather data about type of bruxing behavior, painful sites on awakening andsigns and symptoms of both bruxing behavior and temporomandibular disorders. Forty-six patients with mixedbruxing behavior without temporomandibular disorders and thirty-seven subjects with neither bruxing behavior nor temporomandibular disorders were used as controls. Criteria for sleep and diurnal bruxing behavior andtemporomandibular disorders were used.

**Results:** The frequencies of sleep, diurnal and mixed bruxing behavior in 194 bruxers were about 54.1%, 22.2%, and 23.7%, respectively. The frequencies of morning awakening with headache were about 51.4%,; 4,7%; 30,4% and 8,1% in the sleep bruxing behavior, diurnal bruxing behavior; mixed bruxing behavior subgroup without temporomandibular disorders, and in the non bruxing behavior non temporomandibular disorders subgroups, respectively. Sleep bruxers demonstrated higher frequency of pain distributed over a wider anatomic area as compared to the other subgroups.

**Conclusion:** Sleep bruxism occurs more frequently than diurnal and mixed bruxism. Morning awakening with headache is a commonersymptom in sleep and mixed bruxing behavior subjects. Musculoskeletal pain in sleep bruxerswith is distributed over a wider craniofacial area.

**Keywords:** Sleep bruxism. Diurnal Bruxism.Temporomandibular Disorders. Morning awakening with headache.

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### I. Introduction

Temporomandibular disorders (TMDs) is a collective term used to describe a set of related disorders affecting the temporomandibular joints (TMJs), masticatory muscles, and adjacent musculoskeletal structures presenting with common symptoms and signs including pain and limited mouth opening<sup>1</sup>.TMDs may be part of an interdisciplinary group of somatoform syndromes defined as functional somatic syndromes, characterized by similar mechanisms, etiologies and psychosocial impairment<sup>2</sup>.Bruxing behavior (BB)is a general term used to describe some non-physiologic activities of the masticatory system including clenching, gnashing and grinding the teeth and is usually classified as diurnal (DB) and nocturnal (SB). Such a behavior does not have a known functional purpose and constitutes the most common parafunctional and pathological activity of the stomatognathic system<sup>3</sup>. Probable diurnalbruxing behavior (DB) may be associated with increased odds of having facial muscle fatigue when chewing or talking extensively and pain in the muscles of the face upon awakening<sup>4</sup>.DB is linked to life stress caused by social responsibilities and daily work pressure<sup>3</sup>.

SB is a stereotyped movement disorder classified as a parasomnia and characterized by grinding or clenching the teeth during sleep, usually associated with arousals from sleep<sup>5</sup>. SB may present with headache and is characterized by frequent or regular tooth-grinding sounds during sleep with at least one of the following: Abnormal wear of the teeth, jaw muscle fatigue or pain in the morning, temporal headache, and or locked jaw upon awakening<sup>6</sup>. As a result of periodical mechanical grinding, besides headaches, SB can lead to disruption of the bed partner's sleep, tooth wear, tooth mobility, cheek biting, tongue scalloping, and masticatory muscle hypertrophy<sup>7</sup>. BB is usually associated with the incidence of high magnitude forces applied on the masticatory system. As a consequence, there are signs and symptoms such as muscle pain, TMJ pain, pain in the supporting structures of the teeth, and changes in both enamel and dentin<sup>8</sup>. SB is associated with the so called "arousal response", a sudden change in the depth of sleep during which the individual reaches a lighter sleep stage or simply wakes up. This response is associated with increased body movements and heart rate, respiratory changes and increased muscle activity<sup>3</sup>.

Headache is a common disorder in the United States and its prevalence has increased significantly since 1980. Almost 50% of headache disorder patients are moderately or severely disabled by a headache attack losing workdays and worsening their quality of life<sup>9</sup>. Headaches occur frequently in childhood and become more common and more frequent during adolescence<sup>10</sup>. A relationship between headache and sleep has been accepted in both the lay and scientific literature. Primary headaches without known etiology can be triggered by either short or long periods of sleep, or by interrupted or non-restorative sleep. Additionally, chronic daily headache or headache on waking is strongly indicative of a sleep disorder<sup>11</sup>. SB may cause pain, tiredness in the masseter muscles, headache, oral infections and sleep disorders in patients and some family members<sup>12</sup>.

Sleep bruxers present with morning headache, non-refreshing sleep, abnormal activity during sleep, headache attributed to TMJ disorders, bilateral headache along with pain in the teeth and tender TMJs. SB may be confirmed by the presence of teeth grinding, attrition of the teeth and bi-temporal headache, especially in the morning associated with non-refreshing sleep<sup>5</sup>. Headache occurring during sleep related bruxism usually has the quality of tension-type headache (TTH) and seen maximally during the morning or day<sup>5</sup>. One study<sup>13</sup>, reported that most nocturnal awakening headaches were associated with insomnia, restless leg syndrome, nightmares and SB. It has been theorized that SB may cause headache during the day and that both migraine and TTH may be associated with SB. Periodical mechanical grinding of the teeth may cause headache, tooth wear, disruption of both the bruxer and the partner's sleep, tooth mobility, tongue scalloping, cheek biting and hypertrophy of the masticatory muscles<sup>7</sup>. The gold standard to diagnose SB is polysomnography (PSG). However, the method may not be practical, it has to be carried out at night and is considered expensive. On the other hand, there is scarcity of studies or methods to differentiate SB from DB and about establishing a correlation between morning headaches in bruxers, thus, this investigation is aimed at testing the following hypotheses:

1. In a group of bruxers with or without TMDs, SB occurs more frequently as compared to daytime bruxism and mixed BB;

2. Because there is no motor inhibition of some masticatory muscles at night and stronger masticatory forces are applied by the jaw elevator muscles, the frequency of morning awakening with headache is higher in sleep bruxers with TMDs as compared to diurnal bruxers with TMD, with mixed bruxers without TMDs and with non bruxers and non TMDs subjects;

3. Stronger masticatory forces applied by sleep bruxers may cause pain spread over a wider anatomic area in the face, head and neck on awakening in the morning as compared to diurnal bruxers with TMDs, with mixed bruxers without TMDs and with control non bruxers non TMDs individuals.

## **II. Material And Methods**

### **Sample**

The clinical charts of all patients (n=231) who sought diagnosis and treatment between January 2012 and January 2017 were evaluated comprehensively by a specialist in the field of TMDs and Orofacial Pain (OFM). The principles of the Helsinki declaration were followed rigorously: Patients were informed that there was no absolute risk for their health during clinical evaluation and use of proper questionnaires; that any physical and/ or psychological discomfort warranted the discontinuity of the evaluation, that an accurate/comprehensive evaluation was necessary in order to gather accurate data and establish proper diagnosis<sup>14</sup> before any treatment could be planned, that the principal examiner was an experienced and scientifically qualified person; that there were potential scientific and clinical benefits if his, her or other patients' data were used for research purposes. Further, patients signed a formal consent and were informed that their social, demographic and clinical data could be used for research purposes, but that anonymity was warranted for all patients. Patients were also informed that they were being evaluated comprehensively, they were not subjected to an experimental study, and that their data could be used in future demographic studies. Thus, a prospective study was conducted in 194 patients who were clinically diagnosed with TMDs and nocturnal BB (n=105), diurnal bruxism and TMDs (n=43) and mixed bruxism (MB) without TMDs (n=46). A

group of 37 individuals without bruxism and with no TMDs who also had sought diagnosis and treatment was included as a second control group. These patients and controls presented for diagnosis and potential treatment to our Outpatient Clinic at UNIRG University School of Dentistry during the period January 2012 to January 2017.

**Inclusion Criteria:** The current study included patients ranging in age from 17 to 64 years, males and females with clinical diagnosis of nocturnal bruxism and TMDs (SB+ TMDs+ n=105); diurnal bruxism and TMDs (DB+ TMDs+ n=43) and mixed bruxism with no TMDs (MB+ TMDs-, n=46). In the current study we used self-report, reports from friends, relatives and/or parents, clinical examination and criteria to differentiate diurnal from nocturnal BB. There is evidence that awakebruxism may be diagnosed based on self-report using questionnaires and the anamnestic part of a clinical examination<sup>15</sup>. Inclusion criteria for TMDs: TMDs were considered as present when patients reported at least two of the following signs or symptoms: pain in the TMJs and/ or masticatory muscles, joint noises, difficulties to perform normal jaw movements and jaw deviation during opening.

Inclusion criteria for nocturnal or sleepBB: SB was diagnosed when the characteristics as follows were present and/or reported: A feeling of tension, stiffness and or fatigue in the temporal and/or masseter muscles on awakening in the morning, a feeling of discomfort, difficulty to open the mouth on awakening in the morning and patients, parents, relatives or friends' reports of grinding the teeth at night, patients' report of pain in the teeth, face, TMJ and/or head on awakening in the morning, tongue scalloping scored as moderate, severe or very severe, patient's report of jaw locking on awakening at night or in the morning. Inclusion criteria for awake or diurnal bruxism: Diurnal or awake BB was diagnosed as such if the following signs and/or symptoms were observed and/or reported: Patient's self report of catching himself/herself clenching the teeth during the day, a feeling of tension or stiffness in the masseter and/or temporalis muscle during the day, a feeling of muscle fatigue during the day, more specifically following eating, biting and/or speaking; bilateral and symmetric hypertrophy of the masseter and/or temporal muscles, no sign/ symptom of SB.

The first control group (MB+ TMDs-, n=46) was the one presenting with at least three clinical characteristics of both diurnal and nocturnal bruxism but with no signs and symptoms of TMDs. The second control group (BB- TMDs-, n=37) was a set of patients seeking consultation for a specific complaint, for instance, ear or cervical pain. However, patients in this group could not be included neither in a group of bruxers nor in a group of TMDs patients. To evaluate pain in single and multiple sites including headache on awakening one question in the comprehensive questionnaire used to assess both SB and DB, asks the individual whether he/she presents pain on the teeth, face, head, cervical, TMJ, maxillary or jaw bones regions on awakening. By doing so, pain in different anatomic regions on awakening in the morning can be evaluated in bruxers and non bruxers.

**Exclusion Criteria:** The charts of patients or controls were not included in this study if they presented with information about severe psychiatric disorders, a report of current use of selective serotonin reuptake inhibitors, they were in treatment for TMDs and or BB in another facility, if they stated that they would not allow the dental school to use their material for research purposes and when they did not wish to sign a formal consent to use their material for research purposes.

### III. Data Analysis

Statistical tests deemed to be appropriate in the current study included Kruskal-Wallis' statistics plus Dunn' post hoc test and Fisher's exact test.

### IV. Results

The current study included two experimental groups (SB+ TMDs+ =105 and DB+ TMDs+, n=43) and two control ones (MB+ TMDs- n=46 and BB- TMDs- n=37). Age in the experimental groups ranged from 17 to 64 years and from 17 to 70 years in the control groups. Females predominated in the two experimental and two control groups (91,4%; 86%; 67,4%; and 59,5%, respectively). There was not a significant difference when genre was compared between the SB+ DTMs+ versus DB+ TMDs+ subgroups (Fisher's exact test, p=0.37), or between the MB+ TMDs- versus the BB- TMDs- subgroups (Fisher's exact test, p=0.49). However, there were statistically significant differences in genre when the subgroups SB+ DTMs+ versus MB+ TMDs- (Fisher's exact test p<0.0005), SB+ TMDs+ versus BB- TMDs- (Fisher's exact test, p<0.0001), DB+ TMDs+ versus MB+ TMDs- (Fisher's exact test, p<0.04), and DB+ TMDs+ versus BB- TMDs- (Fisher's exact test, p<0,01), were compared. See table 1 for further details.

It was found that the frequencies of morning awakening with headaches in the SB+TMDs+ (n=105), in the DB+ TMDs+ (n=43) in the MB+ TMDs- (n=46) and in the BB- TMDs- (n=37) subgroups were about 51,4%; 4.7%, 30.4% and 8.1%, respectively. Fisher's exact test SB+ DTMs+ versus DB+ DTMs+ (p<0.0001); SB + DTMs+ versus MB+ TMDs- (p<0.02); SB+ TMDs+ versus BB- TMDs- (p<0.0001); DB+ TMDs+ versus MB+ TMDs- (p<0.001), DB+ TMDs+ versus BB- TMDs- (p>0.65); and MB+ TMDs- versus BB-

TMDs- ( $p < 0.01$ ). Even though the etiology of headache is multifactorial, the higher frequency of awakening with headache in the MB+ TMDs- subgroup (30.4%) as compared with the DB+ TMDs+ subgroup (4.7%) may be explained by the fact that there were many sleep bruxer subjects in the former group as compared to the latter subgroup formed exclusively by diurnal bruxers. In fact, a mixed group of diurnal and nocturnal bruxers was included purposely to assess whether this procedure would increase the frequency of morning awakening with headache. We believe that this procedure lends further validity to the method used to differentiate between sleep and diurnal bruxers in the current study. See Table 2 for further details.

The current investigation found that means in painful sites on awakening in the morning were about 1,7; 0,32; 0,56; and 0,11 in the SB+ TMDs+, DB+ TMDs+, MB+ TMDs- and BB- TMDs- subgroups, respectively (Kruskal-Wallis' statistics  $p < 0.0001$ ): SB+ TMDs+ versus DB+ TMDs+ ( $p < 0.001$ ); SB+ TMDs+ versus MB+ TMDs- ( $p < 0.001$ ); SB+ TMDs+ versus BB- TMDs- ( $p < 0.001$ ); DB+ TMDs+ versus MB+ TMDs- ( $p > 0.05$ ); DB+ TMDs+ versus BB- TMDs- ( $p > 0.05$ ); MB+ TMDs- versus BB- TMDs- ( $p > 0.05$ ). See Table 3 for further details.

## V. Discussion

### Frequency of nocturnal, diurnal, mixed and no bruxing behavior.

In the current study, using a retrospective charts analysis of all those bruxers with or without TMDs seeking diagnosis and treatment for facial pain, TMJ pain, headache and other complaints, it was found that the frequencies of sleep bruxism, diurnal and mixed BB were about 54.1%; 22.2%; and 23.7%, respectively. The outcome of the current study strongly indicates that nocturnal BB occurs more frequently than both diurnal and mixed BB. At first glance, this frequency may seem very high, however, patients were not those from a general population group and they were seeking clinical treatment for their complaints including BB and signs and symptoms of a dysfunctional stomatognathic system. In epidemiological or clinical studies, lower and higher frequencies are expected to be found in the general population and in clinical subgroups, respectively. This point of view concurs with one investigation<sup>16</sup> reporting that the frequencies of SB in the general population varies according to the type of population: 8% in the general population, 13% in persons between 18-29 years of age and 9% in adults.

Because clinical subgroups with TMDs usually present some form of BB, and such a behavior is one of the many causes of TMDs, lower frequencies of BB are to be found in non clinical subgroups. This assumption is reinforced by one investigation<sup>4</sup> reporting a frequency of 22.2% of probable or sleep BB in undergraduate students. Further, when a comprehensive examination including the presence of specific patients' symptoms (jaw locking on awakening in the morning, scalloping of the tongue), self-report or relative or friends' report about SB in TMD patients, a higher frequency of SB may be observed as compared with the frequency found when an isolated symptom or report is considered to evaluate the presence of SB. Concurring with this point of view, one investigation<sup>17</sup> asserts that the frequency of sleep grinding as reported by a sleep partner is seen in only 8% of the population. Using a combination of self report, friends or relatives' report and clinical examination, higher frequencies of sleep, diurnal and mixed bruxing behavior were observed in the current study.

The frequency of SB is expected to be low in the general population but higher in clinical studies. Further, sleep bruxism occurs more frequently, it varies in intensity in every individual and is related to emotional or physical stress<sup>18</sup>. The high frequency of SB found in the current study is in line with one investigation<sup>19</sup>, in TMDs patients in which, even though researchers did not report if all subjects were bruxers in the sample, they reported a frequency of 58.7% of SB, a frequency which is similar to the one we found in the current study.

### Morning awakening with headache

In the current investigation it was observed that 51.4% of sleep bruxers reported headache on awakening in the morning. This frequency was higher and statistically significant when compared to those frequencies found in the diurnal + TMDs subgroup, in those demonstrating mixed bruxism without TMDs and in those subjects without bruxism and without TMDs. The decreasing order of frequency of morning awakening with headache was as follows: Sleep bruxers with TMDs: 51.4%; mixed bruxers without TMDs: 30.4%; non bruxers no TMDs subjects: 8.1% and diurnal bruxers with TMDs: 4.7%. This observation indicates that headache does not occur frequently in diurnal bruxers with TMDs. The frequency of morning awakening with headache reported in the current study was quite similar to the frequency of 65% of morning awakening with headache reported in one investigation<sup>20</sup> in sleep bruxers.

Because the frequency of morning awakening with headache was higher in sleep bruxers with TMDs, the outcome in the current investigation is partially supported by one investigation<sup>21</sup> reporting that bruxism was more prevalent in the headache (23.3%) than in the non headache subgroup (16.5%). It may be that a more frequent headache is correlated with higher frequency of BB and that a severer form of BB predominates in

sleep bruxers. It may also be that other behaviors occur more frequently and concomitantly with SB, thus, inflating the frequency of headache in such subjects as neuromuscular disorders are closely related with headache. Germaine to this issue is one study<sup>21</sup> reporting that snoring, sleep talking, sleep bruxism, sleep terror, nightmares, and awaking from night sleep occur more frequently in those presenting with headaches.

Because we found a higher frequency of headache in sleep bruxers with TMDs (51.4%) and in those with mixed (diurnal and nocturnal BB=30.4%), the outcome of the current study is in line with one investigation<sup>12</sup>, reporting that sleep bruxism can cause pain or tiredness in the masseter muscle, headache, TMJ disorders and dislocation of the lower jaw. Bruxism can result in excessive tooth wear, degenerative TMJ disease and muscular disorders which in turn, lead to headache via muscle pain referred to the **head**<sup>22</sup>. SB may cause headaches during the day including both migraine and TTH as a result of periodic mechanical grinding and excessive nocturnal muscle activity<sup>7</sup>. Studies<sup>19,23</sup>, have reported a significant association between SB, TTH and migraine. **Troeltzsch and colleagues**<sup>23</sup>, reported that the presence of SB increased significantly the likelihood of both TTH and migraine. Sleep bruxism may be associated with increased headache frequency among individuals with migraine<sup>19</sup>.

The high frequency of headache found in both sleep and mixed bruxers (diurnal + nocturnal) in the current investigation is in line with one study<sup>19</sup>, indicating that bruxism can occur during wake and or sleep and can involve multiple muscles of mastication including the temporalis, masseter and medial pterygoids. When a BB patient presents to the neurologist, BB is usually manifested as headaches, facial pain, anxiety and sleep disorders<sup>17</sup>. It has been reported that about 65% of sleep bruxers report frequent headaches<sup>24</sup>. Chronic morning headaches occurs in almost 8% of the general population, with sleep complaints occurring more frequently among those with TTH than migraine<sup>25</sup>. The higher frequency of headache reported in clinical populations can be explained by the observation that both SB and joint pain contribute to increase both frequency and intensity of headache. In one investigation<sup>13</sup>, researchers reported that most nocturnal awakening headaches were associated with insomnia, restless leg syndrome, nightmares and SB. However, awakening at night with headache is a different phenomena as compared with morning awakening with headache.

Because SB is characterized by faulty or abnormal motor inhibition, it follows that sleep bruxers apply intense forces on both teeth and supporting structures. These intense forces may be dissipated locally and or be distributed over a larger anatomic area including the head, thus resulting in headache. This assumption is in line with one study<sup>16</sup>, indicating that parafunctional or motor activity at night in which intense forces are sometimes developed by sleep bruxers, results in headache, TMJ and masticatory pain when the patient wakes up in the morning. Patients with headache report significantly more frequent and intense tooth contact, more masticatory muscle tension and more pain in the head and face than controls<sup>26</sup>. There is a strong relationship between SB and headaches and many bruxers and headache patients report morning awakening with headache. This assumption is reinforced by one investigation<sup>19</sup>, reporting a high frequency of sleep bruxism in patients presenting with migraine and TTH.

#### **Pain distributed over a wider anatomic area in sleep bruxers reporting morning awakening with headache.**

In the current study we found that sleep bruxers with TMDs demonstrated not only a higher frequency of headache, but pain distributed over a wider anatomic area in the face and head as compared with diurnal bruxers (DB), mixed bruxers (MB) and control non bruxers non TMDs (BB- TMDs-). Findings in the current investigation concur with one investigation<sup>27</sup>, reporting a strong association between SB and headache, facial pain, masticatory muscles fatigue and dental pain. Pain distributed over a wider anatomic area in sleep bruxers is the result of prolonged contraction and hypertonic masticatory muscles<sup>28</sup>. SB may cause harmful effects on many components of the stomatognathic system including the teeth, periodontal tissue, masticatory muscles and TMJs. However, these effects are not observed in all nocturnal bruxers with TMDs<sup>29</sup> probably due to different magnitude of forces applied to the tissues during longer or shorter periods of time. In other words, some forces even of greater magnitude than normal, may be resisted by the components of the stomatognathic system.

The outcome of the current study is also in line with one investigation<sup>4</sup>, indicating that sleep bruxers are more likely to use high magnitude forces on all components of the masticatory system as many bruxers complain of widespread pain including pain in the muscles, TMJs, teeth, periodontal membrane and even bones. Due to the tremendous forces applied to teeth, alveolar bone, maxilla, and TMJs, BB has a destructive effect on many components of the masticatory system causing more widespread pain<sup>29</sup>. In bruxers, widespread pain may also be observed more specifically when awaking in the morning<sup>30</sup>. Further, patients suspected of sleep BB may present to specialized orofacial pain clinics with painful symptoms in a wider anatomic area. Such symptoms include tooth hypersensitivity, myalgia, TMJ pain and even headache<sup>30</sup>. Even the cervical region may be affected with pain in sleep bruxers<sup>16</sup>. It may be that more widespread pain in sleep bruxers with TMDs is associated with a higher level of somatization as a higher frequency of nonspecific symptoms are observed in such individuals<sup>30</sup>.

## VI. Conclusion

In those bruxers presenting with TMDs, SB occurs much more frequently as compared with diurnal and mixed BB. Headache is strongly associated with sleep disorders. Headache on awakening in the morning occurs much more frequently in sleep and mixed bruxers as compared with diurnal bruxers. Sleep bruxism is not the only cause of headache, a disorder which occurs probably associated with intense and/or frequent forces applied on the teeth, alveolar bone, masticatory muscles and TMJs. Pain on awakening in sleep bruxers occurs distributed over a wider anatomic area as compared with diurnal and mixed bruxers. Such widespread pain is probably the result of strong nonmasticatory forces applied on many components of the masticatory system. Other studies are mandatory to find out the relative role of SB on headache on awakening in the morning as compared to other deleterious abnormal and destructive sleep behaviors that may occur concomitantly with SB in many individuals.

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**Table1:** Social and demographic data in sleep (SB) and daytime bruxers (DB).

	SB+T		DB+T		MB+T		BB- N=37	
	MDs+ N=105		MDs+ N=43		MDs- N=46		TMDs- N=37	
GENR	n	%	n	%	n	%	n	%
Female	96	91.4	37	86	31	67.4	22	59.5*
Males	9	8.6	6	14	15	32.6	15	40.5
Totals	105	100	43	100	46	100	37	100
Age	Mean 35.4		32.4		35.6		35.8**	
	SD 11.9		11.9		11.5		15.0	
	Range 17-64		17-64		17-56		17-70	

\*Fisher’s exact test: SB + TMDs+ versus DB + TMDs+ (p=0,37);SB+ TMDs+ versus MB+ TMDs- (p<0.0005); SB+ TMDs+ versus BB- TMDs- (P<0.0001); DB+ TMDs+ versus MB+ TMDs- (p<0.04); DB+ TMDs+ versus BB- TMDs- (p<0.01); MB+ TMDs- versus BB- TMDs-(p>0.49).

\*\*Kruskal-Wallis statistics p>0.49.

**Table 2:** Frequency of Awakening with Headache in Sleep (SB+TMDs+),daytime (DB+ TMDs+), mixed (MB+ TMDs-) bruxers andcontrols non bruxers (BB- TMDs-).

	SB+TMDs+ n=105		DB+ TMDs+n=43		MB+ TMDs- n=46		BB-TMDs- N=37	
Morning awakening with headache	n	%	n	%	n	%	n	%
Yes	54	51.4	2	4.7	14	30.4	3	8.1*
No	51	48.6	41	95.3	32	69.6	34	91.9
Totals	105	100	43	100	46	100	37	100

\*Fisher’s exact test: SB+ TMDs+ versus DB+ TMDs+ (p<0.0001); SB+ TMDs+ versus MB+ TMDs- (p<0.02);SB+ TMDs+ versus BB- TMDs- (p<0.0001); DB+ TMDs+ versus MB+ TMDs- (p<0.001); DB+ TMDs+ versus BB- TMDs- (p>0.65); MB+ TMDs- versus BB- TMDs- (p<0.01).

**Table 3:** Means in painful sites in sleep bruxers (SB+ TMDs+, n=105), diurnal bruxers (DB+TMDs+, n=43), mixed bruxers (MB+ TMDs-, n=46) and controls with and without bruxing behavior (BB- TMDs-, n=37).

	SB+TMDs+ n=105	DB+TMDs+ n=43	MB+TMDs- n=46	BB-TMDs n=37
Painful sites				
Means	1.7	0.32	0.56	0.11**
SD	1.3	0.56	0.81	0.40
Range	0-5	0-2	0-3	0-2

\*\* Kruskal-Wallis’ statistics with Dunn’s, p<0.0001:

SB+ TMDs+ versus DB+ TMDs p<0.001; SB+ TMDs+ versus MB+ TMDs- p<0.001; SB+ TMDs+ versus BB- TMDs- p<0.001; DB+ TMDs+ versus MB+ TMDs- p>0.05; DB+ TMDs+ versus BB- TMDs- p>0.05; MB+ TMDs- versus BB- TMDs- p>0.05.

\*Omar Franklin Molina. "Awakening with Headache In Sleep, Diurnalbruxers And Controls Without Bruxing Behavior." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) 16.8 (2017): 35-41.