



## ORIGINAL ARTICLE

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**Receipt:** 08/21/2014 **Revised:** 09/09/2014  
**Acceptance:** 10/01/2014 **Online:** 10/01/2014

## Bruxism frequency and dental occlusion type in a group of Mexican adolescents.

**Abstract:** Bruxism is a parafunctional habit characterized by the relentless action of clenching and grinding teeth in an inappropriate way. It can be developed when dental occlusion is altered due to premature contacts between teeth and excursive occlusal interferences. These features can influence its frequency, intensity and duration. The objective of the study was to evaluate the frequency of the habit of bruxism and its relationship with the type of dental occlusion in a group of teenagers. A total of 278 teenagers enrolled in undergraduate level were examined. A questionnaire and an oral examination were conducted for the epidemiological survey. For this purpose, an examiner was previously standardized (malocclusion kappa=0.89, bruxism kappa=0.93). A 51.5% of the adolescents presented bruxism. It was more frequent in the category of the 17-year-olds, with no significant differences by sex. An 81.4% showed a type of dental malocclusion, of which 57.6% were cases of Class I malocclusion, 21.4% of Class II and 2.4% of Class III, without a relationship between bruxism and these categories of dental malocclusion. Conclusion. Bruxism frequency was high, with similar distribution by sex. No association with the type of dental occlusion or with dental malocclusion frequency was found.

**Keywords:** *Cross-sectional study, bruxism, dental occlusion, adolescents.*

*Cite as: Murrieta J, Cielo V, Morales J, Sánchez C, Linares C & González M. Bruxism frequency and dental occlusion type in a group of Mexican adolescents. J Oral Res 2014; 3(4):211-217.*

### INTRODUCTION.

Bruxism is the term which refers to the ongoing action of clenching and grinding teeth improperly<sup>1-2</sup>. There are two types of bruxism: central, known as forced closure of teeth and eccentric, which includes teeth clenching<sup>1-3</sup>. People with bruxism often do not realize that they have developed this habit until clinical manifestations appear in the oral cavity as a result of its presence, like tooth wear, facial pain, tooth sensitivity, tension in the muscles of the face and jaw, headache, and mandibular dislocation and clicking sounds in the temporomandibular joint<sup>2-6</sup>. It is also important to mention that each individual may experience these signs and symptoms in a different manner<sup>5</sup>. Also they are usually not obvious, and although some are indicative, none is pathognomonic, except the dental and articular noises<sup>3-6</sup>.

Clinical manifestations may vary depending on the

time, frequency and intensity with which it is practiced. However, its importance lies in the fact that when it becomes chronic and exceeds the subject's physiological adaptations there are effects in dental occlusion, the periodontium and the temporomandibular joint<sup>4-7</sup>. It can persist into adulthood and occurs equally in both sexes<sup>1,3-6,7</sup>. The interesting thing about this process lies in the fact that there may be a double connection. First, because the presence of this habit can alter dental occlusion or, if it is already altered, it can induce the development of bruxism<sup>1-4</sup>.

The etiology of bruxism has not been established with clarity. Nevertheless, its presence has been attributed to different types of disorders, from stressful situations to emotional tension and sleep alterations<sup>5</sup>. Its relevance in relation to dental occlusion lies in the fact that it is seen as a local factor which can alter dental occlusion,

since its practice may modify clinical dental conditions, characterized mainly by the presence of premature contacts between teeth and excursive occlusal interferences. These conditions can create a risk, for which the dental occlusion is disrupted, and the greater this alteration is, the greater the malocclusion severity will be<sup>5-9</sup>. Taking into account that this habit is practiced unconsciously by many individuals, it is somewhat complex to diagnose and therefore assess its frequency in the general population, however, it is estimated that a high proportion of it presents it. Its behavior is very variable since percentages ranging from 6.2% in Chileans and Iranians, up to 63.5% in Hindus have been reported. This shows that there is not a precise pattern to define the probability of this habit<sup>10-14</sup>. In terms of its etiology, stress and anxiety are identified as the factors which influence its development with greater frequency in most cases in which it was detected in adolescent and adult population<sup>10,12,13,14</sup>.

Regarding oral alterations associated with the presence of this habit, alterations in dental occlusion, which have been observed in up to 72% of the cases, are the most frequent, but also others have been identified at a lower rate, like myalgia in chewing muscles, joint sounds in the TMJ and tooth abrasion<sup>13,14</sup>. Concerning gender, higher percentages of bruxism have been reported among females; however, no relationship between both variables has been demonstrated<sup>14</sup>. The same is true for age, in spite of that, bruxism is much more frequent in subjects between 20 and 40 years old<sup>15</sup>.

In terms of the frequency of dental malocclusions, a high frequency is reported at a global level, since between 65% and 89% of the population has some type of malocclusion, as reported by Aikins *et al.* and Phaphe *et al.*<sup>16-17</sup> in Nigerian and Hindus, Grando *et al.*<sup>18</sup> in Brazilian and Cavalcanti *et al.*<sup>19</sup> in Peruvian. Class I malocclusion is the most frequently observed in comparison with Class II and III<sup>16-24</sup>. The behavior of the Mexican population is not very different. Sánchez *et al.*<sup>25</sup>, Murrieta *et al.*<sup>26,27</sup> and Ramírez *et al.*<sup>28</sup> mentioned equally high frequencies in different population groups. Distribution by age and

sex has shown that this behavior is variable, in particular considering sex, since authors like Aikins *et al.* and Phaphe *et al.*<sup>16,17</sup>, Grando *et al.*<sup>18</sup> and Gelgör *et al.*<sup>20</sup> reported a higher frequency in males, contrary to that reported by Cavalcanti *et al.*<sup>19</sup>, Almeida *et al.*<sup>22</sup> and Folaranmi *et al.*<sup>29</sup> who observed more frequency in women. However, the results of the investigations undertaken by Gelgör *et al.*<sup>20</sup>, Aikins *et al.* and Phaphe *et al.*<sup>16,17</sup>, Sánchez *et al.*<sup>25</sup> and Ramírez *et al.*<sup>28</sup> agree that these differences are not significant, making it clear that the frequency of malocclusions did not have any relationship with these two variables<sup>17,18,20,21,24-27,29,30</sup>.

For these reasons, the present study aimed to evaluate bruxism frequency and its possible relationship with the type of occlusion in a group of Mexican male and female adolescents, between 16 and 18 years old, who were enrolled in East College of Sciences and Humanities, from the Universidad Nacional Autónoma de México (UNAM), in the Iztacalco Delegation, Federal District, Mexico.

## MATERIALS AND METHODS.

A descriptive, cross-sectional and prospective observational study was conducted among 278 young Mexicans enrolled in the East College of Sciences and Humanities, in the Iztacalco Delegation, in the Federal District. In the study, all male and female students between 16 to 18 years old who attended the morning classes in the school campus were included. This age range was considered since it represents most of the ages of the students of this center. Those students who did not comply with these requirements, had some physical or psychological limitation, presented bruxism due to psychiatric medication intake, or whose parents did not authorized them to participate in the study were excluded.

The project was approved by the subcommittee on Bioethics and Biosafety, belonging to the Research Committee of the Faculty of Graduate Studies from UNAM in Zaragoza. Also, their participation in the study was explained to each of the students and, if they agreed to participate, they were told to ask their parents to sign the informed consent. This way, the ethical-legal aspects of

the research were taken into account.

To ensure the epidemiological survey was reliable, the standardization of the examiner was carried out in four working sessions thus avoiding bias due to tiredness. Kappa coefficient values were calculated for each of the variables to measure in order to verify that there were not random comments and guarantee the lowest intra-observer possible variability (malocclusion kappa=0.89, bruxism kappa=0.93).

The clinical examination was carried out in a classroom set up with two seats and two work tables, under the light of day. It was done through palpation and the oral inspection was assisted by a no.5 plane dental mirror without magnification and auscultation was done with a binaural stethoscope.

To identify the presence of bruxism, an intra and extra oral clinical examination was carried out. Through it, dental abrasion, tooth sensitivity, facial pain, muscle hypertonicity, history or presence of mandibular subluxation, presence of clicking sounds in the temporomandibular joint (TMJ) and history of headaches were observed. To consider it positive and therefore that it was a case of bruxism, there should be evidence of at least three of the signs and symptoms described above apart from dental abrasion (when wear polished facets coincided with those of the opposing tooth at the time of the clinical examination).

For diagnosis and classification of the type of occlusion, the criteria set out by Angle were taken into account only considering the presence of normocclusion or Class I, II and III malocclusion, without types or subdivisions. It was classified as malocclusion when the mesial buccal cusp of the permanent maxillary first molar occluded in the mesial buccal furrow of its lower counterpart without altering the relationship between the upper and lower front teeth. It was classified as Class I malocclusion when the mesial buccal cusp of the permanent maxillary first molar occluded in the furrow of the mesial buccal permanent lower one, but the student had some type of alteration in the relation of upper and lower teeth

at the anterior sextant. It was classified as Class II malocclusion when the mesial buccal furrow of the permanent mandibular first molar did not longer receive the mesial buccal cusp of the permanent maxillary first molar but made contact with the distobuccal top of it, or was even more distal. Finally, it was classified as Class III malocclusion when the permanent mandibular first molar occluded mesially to the permanent maxillary first molar, that is, when the mesial cusp occluded on top of the mandibular premolars.

For processing and presenting statistical data, they were classified according to the variables of interest for the study and encoded by assigning a numeric code in order to facilitate their identification and location. Data were tabulated in an Excel spreadsheet, which made it possible to export data to IBM SPSS 19.0 version for Mac®.

Absolute frequencies and proportions were calculated to evaluate bruxism frequency and type of occlusion by age and sex. To evaluate the possible relationship between bruxism frequency and type of malocclusion the value of Pearson Chi square was calculated and, when some of the cells had a value that was less than or equal to five, the value of likelihood ratio was calculated. To evaluate the possible relationship between bruxism frequency and type of dental occlusion the Yates' correction for Chi square was calculated, because the variables in question had nominal categories, whose distribution was presented in 2X2 contingency tables, in which the expected values in each cell were always higher than five. To facilitate data interpretation and analysis, the results were presented in tables and graphics designed in Office Excel 2010 Microsoft®.

## RESULTS.

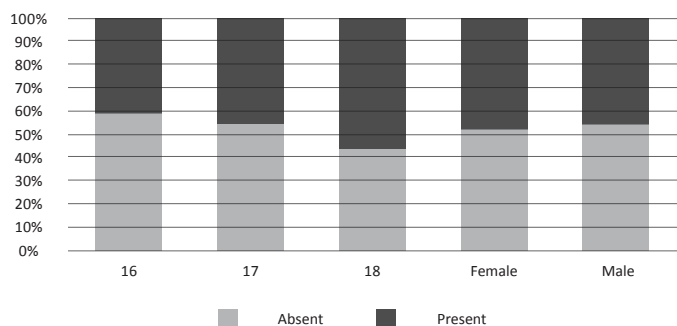
It was considered a total of 278 young people between 16 and 18 years old, of both sexes, with an average age of  $16.97 \pm 0.61$ , who were enrolled in the East College of Sciences and Humanities (CCH), from the (UNAM), located in the Iztacalco Delegation, in the Federal District, Mexico (Table 1).

A 47.5% of the adolescents examined showed the habit of bruxism. The age category with the highest frequency was 17 years old. In terms of sex, both women and men showed a similar frequency in the number of cases of bruxism (Figure 1).

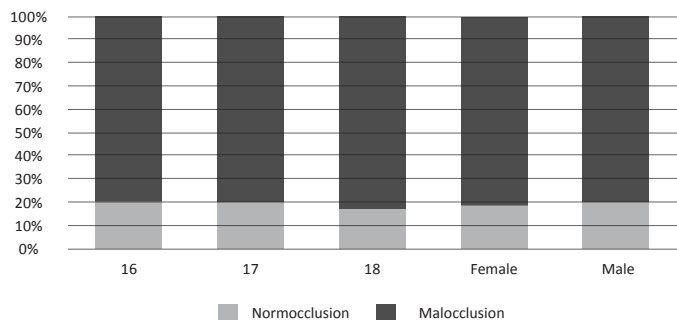
**Table 1.** Percentage distribution of the study population according to the adolescents' age and sex.

Age*	Female		Male		Total	
	f	%	f	%	f	%
16	23	8.3	32	11.5	55	19.8
17	91	32.7	85	30.6	176	63.3
18	23	8.3	24	8.6	47	16.9
<b>Total</b>	<b>137</b>	<b>49.3</b>	<b>141</b>	<b>50.7</b>	<b>278</b>	<b>100.0</b>

\*\* years old.



**Figure 1.** Percentage distribution of bruxism according to age and sex in 278 students from the East College of Sciences and Humanities from UNAM.



**Figure 2.** Percentage distribution of type of dental occlusion according to age and sex in 278 students from the East College of Sciences and Humanities from UNAM.

Regarding percentage distribution of cases according to type of dental occlusion, 80.2% of the adolescents examined showed dental malocclusion. The age category with the highest frequency was 17 years old. Bruxism frequency by sex turned out to be similar between men and women (Figure 2).

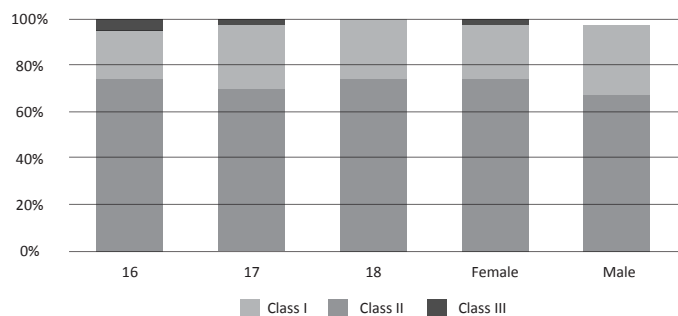
In relation to the percentage distribution according to type of dental malocclusion, Class I malocclusion according to the classification of Angle was the most frequent (71.7%) and followed by Class II and III (26.5% and 1.8%, respectively). According to age, it is observed a similar behavior according to the type of malocclusion and Class I malocclusion predominated in each age category. In terms of sex, there were not changes in the percentage distribution of malocclusion in both men and women and Angle's Class I malocclusion was observed to be the most common (Figure 3).

With respect to bruxism frequency and its relationship with the type of dental occlusion, dental malocclusion was not so common in adolescents with bruxism, which did not show any significant relationship between the two variables ( $X^2Y=1,049$ ,  $p=0.271$ ). Finally, as to the possible relationship between bruxism and type of dental malocclusion, no trend of this variable according to the distribution of dental malocclusion based on the angle classification, and hence no association was observed between bruxism and this variable (Likelihood ratio=1.195,  $p=0.550$ ) (Figure 4).

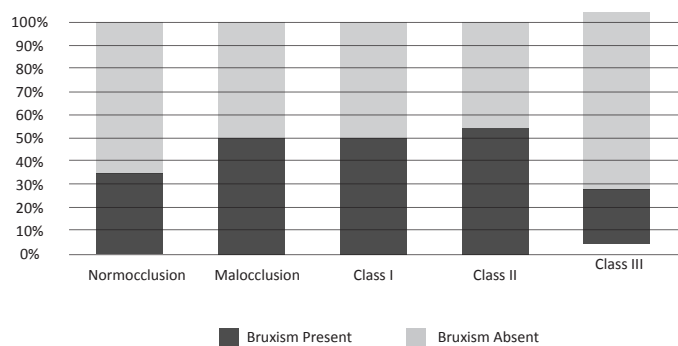
## DISCUSSION.

In general, bruxism frequency in this group of teenagers was high, in accordance with what had been reported by Batista<sup>5</sup> in Cubans, but at the same time lower in comparison with those reported by Cavalcanti *et al.*<sup>19</sup>, Aliaga *et al.*<sup>21</sup> and Motta *et al.*<sup>11</sup>. This behavior shows that frequency and distribution of this habit is so variable that is not possible to set a parameter or standard of predictability, since its frequency can change from person to person and in the general population.

In relation to age, bruxism had a variable behavior



**Figure 3.** Percentage distribution of type of dental malocclusion according to age and sex in 278 students from the East College of Sciences and Humanities from UNAM.



**Figure 4.** Percentage Distribution of cases according bruxism the type of dental occlusion and dental malocclusion in CCH students Eastern UNAM.

and it was determined primarily by the relative numbers of each age category. However, it was not the purpose of the study to note if there was a relationship between these two variables. In fact, there is now no information or theoretical model to establish a relationship between these two variables and it is logical. What would support the fact that with increasing age there is a higher risk to adopt and develop this habit? That is why the only intention of this information was to describe how bruxism had been distributed by age.

According to what is observed in the study population, the behavior of cases of bruxism by age was similar to what was observed by Batista<sup>5</sup> and Casassus *et al.*<sup>7</sup> and contrasting with those reported by Motta *et al.*<sup>11</sup> and De Almeida *et al.*<sup>22</sup> who reported a higher frequency. In relation to sex, *et al.* its frequency did not show significant

differences between men and women. This behavior was similar to the one reported by De Almeida *et al.*<sup>22</sup> and Ohayon *et al.*<sup>8</sup>, but different from that observed by Motta *et al.*<sup>11</sup> and Batista<sup>5</sup>, who reported a higher bruxism frequency in women, without showing any relationship between bruxism and sex. Consequently, it seems both women and men have a similar probability to develop this habit, as quoted in other studies which coincide with the fact that bruxism had no association with this variable<sup>5,7,9,11,24,25</sup>. In fact, as it was mentioned when analyzing the behavior of bruxism and its possible association with age, in regard to the sex, there is not any theoretical model to explain what this variable influences so that the habit is acquired with any predisposition either by men or women. As already explained in the introduction to this article, its etiology is oriented to the possible influence of other factors such as emotional stress (anxiety, anger, sadness, and so on) and sleep alterations, which may be more influencing in the development of this habit.

Respecting frequency of dental malocclusion, it presented a high frequency. A behavior which was higher than that reported by Aikins *et al.* and Phaphe *et al.*<sup>16-17</sup> in Nigerian and Hindus, Sanchez *et al.*<sup>25</sup>, and Ramirez *et al.*<sup>28</sup> in Mexicans; and less than that observed by Grando *et al.*<sup>18</sup>, Murrieta *et al.*<sup>26-27</sup> and Cavalcanti *et al.*<sup>19</sup> in Brazilians, Mexicans and Pakistanis. Also, age and sex distribution was similar to the one reported by Grando *et al.*<sup>18</sup>, Aikins *et al.* and Phaphe *et al.*<sup>16-17</sup>, but different to what was observed by Ghafournia *et al.*<sup>23</sup>, Kaur *et al.*<sup>24</sup>, and Murrieta *et al.*<sup>26-27</sup>. distribution according to type of dental malocclusion, either Class I, II or III malocclusion, was similar to that reported by Grando *et al.*<sup>18</sup>, in Brazilians and Ramirez *et al.*<sup>28</sup> in Mexicans, but different from what was observed by Aikins *et al.* and Phaphe *et al.*<sup>16-17</sup> in Nigerian and Hindus and Murrieta *et al.*<sup>26-27</sup> in Mexicans. This shows it has a high frequency and distribution but is also variable, probably because its presence and development depend on a myriad of factors which may or may not be present individually and collectively at a given time, such as genetic characteristics and den-

tition, the presence of parafunctional habits, craniofacial development and style of life, among others. Bruxism frequency was not related to the type of occlusion or dental malocclusion, as described by Manfredini *et al.*<sup>1</sup>, Casassus *et al.*<sup>7</sup> and Chan<sup>9</sup>.

In spite of the fact that no relationship was found between these variables, it does not exclude the possibility that there may be a connection between them in other populations which were not clear in this study group. However, it should be kept in mind that bruxism can generate forces which alter the inappropriate development and establishment of dental occlusion. Secondly, it should be considered that alterations in dental occlusion, when

displaying occlusal interferences, can lead to bruxism as a consequence of premature contact points between teeth, or excursive occlusal interferences. Additionally, severity of the dental malocclusion can be related not only to bruxism but to its frequency, intensity and duration. These variables were not considered in this study.

## CONCLUSION

Bruxism frequency was high, without a significant relationship with the type of dental occlusion, nor malocclusion in this study population. However, it does not exclude the possibility that there may be a relationship between these two variables in other population groups.

### Frecuencia de bruxismo y tipo de oclusión dental en un grupo de adolescentes mexicanos.

**Resumen:** El bruxismo es un hábito parafuncional que se caracteriza por la acción incesante de rechinar y apretar los dientes de manera inadecuada, el cual puede ser desarrollado cuando la oclusión dental se encuentra alterada debido a los contactos prematuros entre los dientes e interferencias oclusales excursivas, características que pueden influir en la frecuencia, intensidad y duración como es adoptado. El objetivo del estudio fue evaluar la frecuencia del hábito de bruxismo y su relación con el tipo de oclusión dental, en un grupo de adolescentes. Se examinaron un total de 278 adolescentes inscritos a nivel de bachillerato. Para la encuesta epidemiológica se aplicó un cuestionario y se realizó un examen bucal, para

tal fin una examinadora fue previamente estandarizada (maloclusión kappa=0,89, bruxismo kappa=0,93). El 51,5% de los adolescentes presentó bruxismo, siendo más frecuente en la categoría de 17 años de edad, sin diferencias por sexo. El 81,4% mostró algún tipo de maloclusión dental, de los cuales, el 57,6% fueron casos de maloclusión Clase I, el 21,4% Clase II y el 2,4% Clase III, sin que se observara relación alguna entre el hábito del bruxismo con estas últimas categorías de maloclusión dental. La frecuencia de bruxismo fue alta, con distribución similar por sexo, sin que se observara asociación alguna con el tipo de oclusión dental, o bien, con la frecuencia de maloclusión dental.

**Palabras clave:** *Estudio transversal, bruxismo, oclusión dental, adolescentes*

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