



## Correlation between bruxism and tooth wear: an in-depth analysis

Correlación entre bruxismo y el desgaste dental: un análisis en profundidad

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### ABSTRACT

**Introduction:** teeth have a double importance: esthetic and functional for chewing and digestion of food. However, factors such as bruxism can cause adverse effects, such as dental attrition.

**Objective:** to argue the relationship between bruxism and dental attrition.

**Methods:** a narrative review was carried out by means of descriptors and publication ranges. The descriptors used were: bruxism, dental attrition, dental wear, sleep classification and dental and occlusal incisors. On the other hand, the range of publication years was established between the period 2018 and 2023. All the bibliographic materials were located in open databases and recognized web pages in the field of health and dentistry, where the figures of Manual MSD, MedlinePlus, Scielo, Scopus and PubMed stand out, a total of 22 scientific productions were obtained.

**Development:** primary or idiopathic bruxism manifests itself during the daytime and is the result of diseases or medical causes; on the other hand, secondary or iatrogenic bruxism occurs at night, during sleep, and is caused by sleep disorders, psychiatric problems and drug use. Bruxism causes gradual wear of the teeth, especially the central incisors and the surrounding tissue, due to abnormal and frequent jaw movements with excessive force, between 100 and 115 kg, generating clashing sounds or tooth grinding.

**Conclusions:** tooth grinding and abrupt jaw movements are easy to identify, therefore, immediate treatment is recommended to control these movements and thus avoid dental attrition in the future.

**Keywords:** Dental Attrition; Bruxism; Esthetics, Dental; Tooth Wear.

## RESUMEN

**Introducción:** los dientes tienen una doble importancia: estética y funcional para la masticación y digestión de alimentos. Sin embargo, factores como el bruxismo pueden provocar efectos adversos, como la atrición dental.

**Objetivo:** argumentar la relación existente entre el bruxismo y la atrición dental.

**Métodos:** se realizó una revisión narrativa por medio de descriptores y rangos de publicación. Los descriptores empleados fueron: bruxismo, atrición dental, desgaste dental, clasificación del sueño e incisivos dentales y oclusales. Por otro lado, el rango de años de publicación fue establecido entre el período 2018 y 2023. Todos los materiales bibliográficos se localizaron en bases de datos abiertas y páginas web de reconocimiento en el campo de la salud y odontología, en donde, se destacan las figuras de *Manual MSD*, *MedlinePlus*, *Scielo*, *Scopus* y *PubMed*, se obtuvo un total de 22 producciones científicas.

**Desarrollo:** el bruxismo primario o idiopático se manifiesta en horario diurno y es producto de enfermedades o causas médicas, por otro lado, el bruxismo secundario o iatrogénico se da en horario nocturno, durante el sueño y son ocasionados por desórdenes del sueño, problemas psiquiátricos y consumo de drogas. El bruxismo provoca desgaste gradual de los dientes, especialmente los incisivos centrales y el tejido circundante, debido a movimientos mandibulares anómalos y frecuentes con una fuerza excesiva, entre 100 y 115 kg, generando sonidos de choque o rechinar dental.

**Conclusiones:** el rechinar en los dientes y los movimientos mandibulares bruscos son fáciles de identificar, por tanto, se recomienda un inmediato tratamiento para controlar estos movimientos y así evitar la atrición dental a futuro.

**Palabras clave:** Atrición Dental; Bruxismo; Estética Dental; Desgaste Dental.

## INTRODUCTION

Teeth are considered to be the most important part of the structure of the oral cavity and digestive system of people. They fulfill essential functions, with emphasis on the chewing process, which allows the balanced release of lubricants and enzymes in the mouth, to initiate the process of decomposition of food, substances and organic pieces, in order to ingest and digest them. Therefore, it can be seen that the teeth are the initial link to carry out an adequate digestive process and, therefore, they must be cared for with the utmost hygiene and attention.<sup>(1)</sup>

However, the latest report of the American Dental Association,<sup>(2)</sup> presents a worrying statistic, which indicates that 4 out of 10 people have problems with their teeth, especially with wear and tear in their shape. The main factors of tooth wear are associated with inadequate tooth hygiene, which causes erosion and dissolution of tooth enamel due to the presence of sticky sugars and acidic substances. Similarly, wear is directly associated with diseases or disorders, with special mention of bruxism, which, through sudden grinding movements, compromises the shape and even the original structure of the teeth.

In this sense, in the first instance it is inferred that bruxism and tooth wear have a marked relationship, in addition, the research of Barranca A et al.,<sup>(3)</sup> Godoy L et al.,<sup>(4)</sup> agree that people with bruxism clench and grind their teeth involuntarily and unconsciously and, in general, it is more frequent and intense during sleep. Despite the fact that people are resting and resting, their teeth present a high level of wear, since the coarse grinding movements are performed with a force that ranges between 110 kg and 115 kg (1.700 kilopascals), due to the lack of an active feedback and protection mechanism.

Emphasizing the research variables, in the first place, according to the study by Contreras LC et al.,<sup>(5)</sup> bruxism states that it is an unconsciously acquired habit, which causes people to clench their teeth involuntarily and thus generate tension in the mandibular muscles and grinding of the teeth, which in the future generates wear in the teeth, especially in the central incisors. Additionally, the study by Marcos AB et al.,<sup>(6)</sup> mentions that bruxism is a sleep-related disorder, in which people grind and clench their teeth while sleeping, thus increasing the probability of developing new disorders such as snoring, sleep apnea, among others.

On the other hand, for Hernandez B et al.,<sup>(7)</sup> the variable of dental attrition is considered as a physiological wear in the hard tissues of the dental crown, which is caused by an altered mastication process. Likewise, this phenomenon has incidence in the wear of the posterior and anterior incisal and occlusal surfaces. In addition, the research mentions that dental attrition produces dental structural inconformities due to physiological (muscular movements) and pathological (diseases caused by microorganisms and bacteria) contacts.

The relationship between both research variables, according to Alvarez VA et al.,<sup>(8)</sup> most of the time, it is stated that bruxism does not affect the daily life of people, however, there are few cases where bruxism is present with high intensity and thus generate these complex complications and alterations:

- 1) jaw damage, restorations and crown alterations.
- 2) severe headaches due to jaw tension.
- 3) intense facial and neck pain.
- 4) appearance of disorders in the temporomandibular joints in front of the ears and.
- 5) frequent grinding and clicking with movements of opening and closing the mouth.

With regard to research background, in the first place, the academic article by Lazo R et al.,<sup>(9)</sup> states that bruxism and dental attrition are variables with a strong level of correlation, due to the fact that 90,9 % of cases of people who grind their teeth, these in the future present damage and wear in their teeth. With regard to the remaining cases, worse damage occurs when people suffer from obstructive sleep apnea and gastroesophageal reflux (GERD), where the dental crowns are compromised with perforations, fractures, pits and wear on the opposing tooth.

On the other hand, the research work of Nieto S et al.,<sup>(10)</sup> in his study shows that 95 % of people who suffer from this habit, prove to be people with anxiety or stress problems and, therefore, tend to feel ashamed to make these movements, but do not have the physiological ability to control them. At world population level, a significant part of people with bruxism present abnormal shapes in their central teeth (central incisors), where an approximate wear of 2 mm is observed in comparison to a normal shaped tooth.

Finally, the academic article by Segarra JO et al.,<sup>(11)</sup> states that bruxism presents initial problems in its diagnosis, due to the fact that in most cases it is the result of a sleep disorder and professionals focus on the state of the teeth. In this study, bruxism has an average representation of 8,0 % of the world population, with an average of 78,8 % of males between 25 and 64 years of age. In relation to bruxism and dental attrition, this research has shown that there is a curious visual perception in the smile of people with bruxism due to tooth wear, where people with this disorder show a smile with smaller teeth.

In this context, it can be seen that bruxism and dental attrition have a direct and negative relationship, where bruxism is a habit contracted unconsciously that initiates serious problems with the wear of the teeth and, therefore, the loss of the health of the teeth and, more importantly, the proper shape and structure of the teeth. Consequently, the objective of the present research is to argue the relationship between bruxism and dental attrition through a review of the literature.

## METHODS

Filtering was carried out by means of descriptors and publication ranges. The descriptors used were: bruxism, dental attrition, dental wear, sleep classification and dental and occlusal incisors. On the other hand, the range of years of publication was established between the period 2018 and 2023, in order to guarantee the criteria of thematic correlation, relevance and timeliness. Finally, it is worth mentioning that the bibliographic material collected is distributed in Spanish, English and Portuguese. All the bibliographic materials were located in open databases and recognized web pages in the field of health and dentistry, where the figures of Manual MSD, MedlinePlus, Scielo, Scopus and PubMed stand out.

With respect to the amount of bibliographic material collected, a total of 88 scientific productions were selected in the first instance, followed by a filtering with the descriptors and ranges of years of publication described above and a total of 22 scientific productions were obtained. These scientific productions complied with the requirements of the present research, classified into 20 academic and/or scientific articles, one book with review by a publishing house and one fourth level research work (master's degree).

## DEVELOPMENT

The results of the research by Astudillo JL and Batista A.,<sup>(12)</sup> describe the following dental lesions originated by bruxism:

**Abfractions:** Lesions with multifactorial origin, which represent lesions in the form of sliding or eccentric traumas, where it is originated by flexion of the tooth with loads of different frequency, intensity, direction and duration. In this aspect, the resistance to bending of the teeth produces considerable compression and tension at the level of the fulcrum and at the level of the cemento-enamel coalition.

**Dental attrition:** Movements and friction during swallowing between the teeth, which causes wear and even erosion of the teeth. The movements are of an eccentric and sliding type, which generates a substantial and direct loss in the central dental pieces.

**Corrosion:** It compromises the tooth surface as a result of electrochemical or chemical actions. Corrosions can be endogenous (caries, crevicular fluid and gastroesophageal reflux) and exogenous (food or beverages with pH below 5.5).

**Abrasion:** Represents rough friction movements between teeth due to exogenous agents.

**Mixed lesions:** This type of problem is represented by altered and non-pure mechanisms that generate damage and dental wear at the same time.

The research of Brunet J et al.,<sup>(13)</sup> assures that the level of dental attrition depends on the type of bruxism that people suffer, therefore, there is a classification of primary and secondary bruxism. Primary or idiopathic bruxism manifests itself during the daytime and is the result of diseases or medical causes; on the other hand, secondary or iatrogenic bruxism occurs at night, during sleep, and is caused by sleep disorders, psychiatric problems and drug use. Based on this classification, this study affirms that 67 % of people with nocturnal bruxism present greater deformity or wear of the teeth, since, during sleep, people perform coarse and strong chewing movements with a force greater than 100 kg (1590 kilopascals) and thus deteriorate the teeth with greater ease and intensity.

The study of Ramirez Cortez CER,<sup>(14)</sup> offers an interesting vision of bruxism, where he mentions that the main effect on the teeth is not the direct wear, but the loss of tissue, which subsequently causes sensitivity and esthetic compromises and considerable changes in mastication. Overall, in all teeth affected by tissue loss, a loss between 20 and 38 mm was estimated in an annual period and, mainly, the periodontium remains flat in occlusion over a given eruption. In a generalized way, bruxism will generate wear in the teeth, however, this study also shows cases with pits, cracked tongue and appearance of scabs or burns in the oral mucosa.

Another outstanding result is given in the study by Serra-Negra et al.,<sup>(15)</sup> who assert that the correlation between tooth wear and bite force is a matter of controversy and debate that the bite has a direct effect on wear. In the same way, it contraindicates that the teeth or central incisors are those that present greater dental wear, in this sense, this study mentions that the anterior teeth are those that suffer more damage and wear, due to the increase of eccentric mandibular movements (displacements of the jaw forward). Finally, this situation generated a greater bite force in the posterior region, due to the proximity to the TMJ (temporomandibular joint), thus producing forces in occlusal disharmony.

On the other hand, the academic article by Nieto Mena et al.,<sup>(10)</sup> considers that bruxism is not the initial factor of a periodontal lesion and neither of the migration towards the apical of the epithelial junction, however, bruxism contributes to the constant pressure exerted by the prolonged and enormous dental contacts and collisions. These contacts are responsible for exceeding the threshold of the collagen fibers located in the periodontal ligament, thus producing an increase in muscular activity that in the future causes strong dental fatigue, compromising the opening of the mandible.

Study by Robayo Rodriguez,<sup>(16)</sup> shows that the real state of bruxism in dental attrition is appreciated through clinical and radiographic diagnosis, since they allow to really appreciate the widening of the periodontal ligament. In the same way, these diagnoses make it possible to visualize the spacing of the alveolar cortex of the laterals towards the root, in the bifurcation, in the apical region and horizontal and vertical remodeling in dental mobility, root resorption and interdental septum. Finally, bruxism is also related to hypercementosis, that is,

affections in the surface and shape of the roots of the teeth with excessive root cement type material.

However, the studies of Serra-Negra et al.,<sup>(15)</sup> Estrada-Murillo & Evaristo-Chiyong,<sup>(17)</sup> agree that bruxism is considered to be a dysfunctional disease, that is, actions performed incorrectly due to neuronal chemical alterations. In this sense, bruxism is considered as a neuronal malfunction, which automatically generates abrupt movements in the oral cavity and thus a constant grinding of the teeth during the chewing process. Similarly, bruxism is the cause of temporomandibular disorders, which begins with constant abnormal jaw movements and in a period longer than a year there are cases of fatigue, decrease in the size of the teeth and eroded areas.

On the other hand, the investigations of Paredes Vinueza et al.,<sup>(18)</sup> Cifuentes-Harris et al.,<sup>(19)</sup> counterindicate that bruxism has multifactorial origins, where there is a predominance of disorders and diseases and even a hereditary condition is related. In this context, these studies have shown that families with medical history with emotional problems and intestinal parasitosis tend to develop problems with bruxism. Likewise, a relationship is made with the level of academic education, since it has been shown that 77 % of people develop bruxism and tooth wear in their university stage between 18 and 24 years of age. The remaining participants in the study were distributed between people without bruxism and people with bruxism, but without tooth wear and with slight facial discomfort.

In the same line of research, the study by Rodriguez & Cadena,<sup>(20)</sup> proposed different approaches to bruxism and its immediate effects, where bruxism was associated with psychological, somatic and phonoaudiological factors, with an emphasis on the following results: categorization of somatic symptoms, with a predominance of tooth wear with 56,6 %, followed by tinnitus with 23,3 %, then dental malocclusions with 10,9 % and, finally, presence of facial muscle pain with the remaining 9,2 %. However, psychological effects were also observed, where a few cases have caused people to lose self-esteem, since they consider that their smile and the sound of grinding their teeth are a source of ridicule in their social circle. Finally, there are cases of less than 1,0 % with psychological effects, with the exposure of actions such as worry, insomnia, stress and tension in the neck muscles.

Regarding the classification of bruxism, the research of Hernandez-Reyes et al.,<sup>(7)</sup> contradicts the initial results, since it considers that people with daytime bruxism tend to wear down their teeth more quickly, since it is estimated that there is a range between sex and eight times a day, where people make involuntary grinding movements. Similarly, it has been identified that people who have jobs or occupations that demand constant talking and interacting with others tend to make between 10 and 15 grinding movements in a day.

Finally, the research work of Arias Leyva et al.,<sup>(21)</sup> mentions that bruxism will mainly cause tooth wear, where people will present an unsightly smile and, therefore, there is a high degree of probability that people will lose self-esteem or feel insecure about themselves when speaking and smiling. In these cases, if the dental wear is important and it affects the emotional and esthetic state of people, it is recommended to use a treatment to recover the shape of their smile, where the placement of veneers or dental facets stands out, since it is a totally natural treatment and with accessible prices, which reconstruct the esthetics of the damaged teeth with porcelain or composite.

## CONCLUSIONS

It is concluded that regardless of the origin of bruxism, it is a direct factor that produces damage to the teeth, especially dental attrition or tooth wear. In this context, teeth grinding and abrupt jaw movements are easy to identify, therefore, immediate treatment is recommended to control these movements and thus avoid dental attrition in the future, which can incur costs in the formation and restructuring of the shape of the teeth, smile and chewing movement of food.

### Conflicts of interest

No conflicts of interest exist

### Authorship contribution

All authors participated in the conceptualization, formal analysis, writing of the original draft, writing – review, editing and approval of the final manuscript.

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