

# Evaluation of the Relationship between Occlusal Interference and Bruxism

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## KEY WORDS

Bruxism;  
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## ABSTRACT

**Statement of Problem:** Bruxism is an oral habit consisting of involuntary rhythmic or spasmodic nonfunctional gnashing, grinding, or clenching of teeth, in other than chewing movements of the mandible, which may lead to occlusal trauma, tooth wear and fracture of the teeth. It would be useful to determine the relationship between occlusal interferences and bruxism in order to prevent its development by occlusal interference adjustment.

**Purpose:** This study evaluates the relationship between occlusal interferences and bruxism.

**Materials and Methods:** For this study, 59 subjects (22 males and 37 females) including 28 bruxers and 31 nonbruxers were selected after filling a questionnaire based on the exclusion criteria. Occlusal interferences in the centric relation and eccentric movements in the two groups were evaluated and recorded. Data were analyzed by SPSS software (Version 16) using Chi-square test.

**Results:** The results showed that there was a statistically significant relationship between bruxism and protrusive interferences ( $p < 0.05$ ) while there was no statistically significant relationship in the centric relation and other eccentric movements ( $p > 0.05$ ).

**Conclusion:** According to the results of this study, due to the relationship between some types of occlusal interferences (protrusive interferences) and bruxism, it would be useful to examine occlusal contacts in bruxing patients to eliminate probable causative or contributing occlusal factors.

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## Introduction

According to the glossary of prosthodontic terms, bruxism is an oral habit consisting of involuntary rhythmic or spasmodic nonfunctional gnashing, grinding, or clenching of teeth in other than chewing movements of the mandible which may lead to occlusal trauma [1]. This habit can be diurnal or nocturnal. Habitual clenching is diurnal bruxism while tooth grinding which often occurs during sleep is nocturnal bruxism [2-3].

The mean prevalence of bruxism is about 20%

in adults and is more common in females [4]. The etiology of bruxism has not exactly been cleared but systemic factors such as allergies, intestinal parasites, nutritional deficiencies, endocrine disorders and emotional stress [5] and local factors such as malocclusions are often considered as etiologic factors [6-9]. In a literature review by Cuccia [10], it is mentioned that the exact cause of sleep bruxism is unclear but it may be associated to some important factors such as smoking, alcohol, drugs, systemic diseases, stress, trauma and heredity; moreover,

some minor factors including the occlusal discrepancies and the anatomy of the bony structures of the orofacial region are involved. The bruxism process is not only a problem for the patient suffering from the pain, dysfunction and possible tooth wear and fracture, it is also the concern of the dentist [11]. So it is essential that those who treat the bruxist patient have an understanding of the etiology of bruxism.

Few studies have attempted to survey the occlusal interferences in relation to bruxism. So it would be useful to determine this relationship in order to prevent bruxism developed by occlusal interferences. According to Ramfjord and Ash, three mechanisms including psychologic stress, pain and malocclusions together are initiators of bruxism [12]. Meklas believed that local factors such as malocclusions and psychological factors are more important than other factors in the etiology of bruxism [13]. Ramfjord's study revealed that some form of occlusal interference is present in every patient with bruxism [14]. Williamson studied the role of the posterior teeth contact in the eccentric jaw movements and found a significant relationship between muscular hyperactivity and occlusal interferences [15]. On the other hand, Manfredini found a weak association between mediotrusive interferences and bruxism, and this association is called for chance [16]. Some reviewers have suggested that peripheral factors such as occlusal-anatomic factors have lost their importance in bruxing, while cognitive behavioral factors such as stress are gaining attraction [17-19].

The aim of this study was to investigate the relationship between the occlusal interferences and bruxism and to evaluate the hypothesis being suggested about the tendency of etiologic factors to shift from occlusal toward psychological factors [16]. The association between bruxism and sex differences was also investigated.

### **Materials and Methods**

In this clinical study, 59 participants (22 males and 37 females) were selected randomly from the 133 patients who were referred to the Department of

Prosthodontics, Shiraz dental school in a period of 6 months. The mean age for the total group was 27 years ranging from 20 to 58 years. The participants were required to meet the inclusion criteria which consisted of a history of good health without psychological or neurologic disorders and presence of all permanent teeth except for the third molars. Patients having gastroesophageal reflux disease (GERD), and those who were using prescription medicine with a known influence on the sleep (such as antipsychotic drugs) were excluded. The patients' information was recorded in a special questionnaire designed for this study. Fifty nine patients agreed to enter the study and signed a consensus module prior to the start of the study.

The subjects were divided into two groups of 28 bruxers and 31 nonbruxers as determined by the clinical examination and self report. The bruxing patients were required to meet all the following predetermined criteria in order to be selected for this study: (1) A self reported history of nocturnal bruxism, (2) Current bruxism reported by the patient or someone else, (3) Presence of wear facets on the teeth, (4) Feeling of muscle fatigue in the morning [16, 20]. The non-bruxism samples were detected based on the subjects' no answers to all inquiries regarding clenching or grinding their teeth as well as an intraoral examination which ruled out obvious signs of bruxing.

The examiner recorded occlusal interferences of 59 participants in all possible positions and movements of the mandible; centric relation (CR), protrusive movement, mediotrusive (nonworking) and Laterotrusive (working) movements. The occlusal examination began with an observation of the occlusal contacts when the condyles were in their optimum functional relationship. Dawson bimanual manipulation technique [21] was used in guiding the mandible into the CR position. In locating CR position with a cotton roll, the anterior teeth were separated for a few minutes in order to deprogram the masticatory muscles and guiding the mandible without the influence of tooth contacts. In the cases in whom reproducibility of the CR was uncertain, the proce-

ture was repeated several times with intervals of 5-10 minutes. The initial interfering CR contact may be perceived by the neuromuscular system as a damaging factor for the teeth; thus, protective reflexes activate and guide the mandible into the maximum intercuspation. To record these initial CR contacts, called the CR interference, the teeth were dried well and the contacts were marked by 28 $\mu$ m articulating paper (Artifol Bausch Dental KG, Koln, Germany).

In evaluating the eccentric occlusal interferences, the examiner evaluated the anterior guidance for its efficiency in excluding the posterior teeth during eccentric (protrusive and lateral) movements. In order to identify the protrusive interferences, the patient was asked to forward the mandible from the maximum intercuspation position and the occlusal contacts which were the protrusive interferences. They were observed and recorded while the anterior mandibular teeth had passed completely over the incisal edges of the maxillary anterior teeth. These contacts were found by using a dental floss (Oral-B essential floss, Braun and Oral-B, Ireland) placed between the teeth and pulling it anteriorly from the most posterior teeth. Interferences, if present, stopped this free movement. Verification of these interferences was done by 28 $\mu$ m articulating paper (Artifol Bausch Dental KG, Koln, Germany) in a different color from the maximum intercuspation contacts. Blue paper was placed between the teeth and the eccentric movement was performed a few times to produce marks on the teeth, and then a red paper was used to mark the maximum intercuspation contacts by tapping the teeth in this position. Blue marks which were not covered by the red marks indicated the interferences. The

nonworking (mediotrusive) side interferences were recorded by guiding the mandible medially while a firm force was placed over the mandibular angle in a superomedial direction, and asking the patient to move the mandible in a medial direction. Any tooth contact on the balancing or nonworking side was considered as a nonworking interference. These contacts were defined as assisted mediotrusive contacts which were found by a dental floss and verified by different colors of articulating paper with the same method.

In examining the laterotrusive (working) interferences, the patient was asked to move the mandible laterally until the canine had passed beyond the end to end relation. In the canines guided occlusions, contacts on any tooth other than canine were considered as interferences. The buccal to buccal laterotrusive contacts were easily visualized on the same side and the type of the laterotrusive guidance was noted (e.g. canine protected, group function, posterior teeth only). Since the grouping of the patients in this study was performed according to a randomization process, the statistical comparisons between the two groups were performed by means of the Chi-square test ( $\alpha < 0.5$  was significant).

## Results

The sample consisted of 59 subjects including 28 bruxers (10 men and 18 women; mean age 27.4  $\pm$  9 years) and 31 nonbruxers (12 men and 19 women; mean age 27  $\pm$  6 years). The results indicate that the prevalence of bruxism in males and females is similar, and no statistically significant difference was found in this population ( $p = 0.812$ ) (table 1).

The distribution of different occlusal interferences

**Table 1** Frequency and percentages of bruxism according to gender

Variable	Gender		Total	
	Female	Male		
Bruxer	Number	18	10	28
	Percent (%)	48.6	45.5	47.5
Non-bruxer	Number	19	12	31
	Percent (%)	51.4	45.5	52.5
Total	Number	37	22	59
	Percent (%)	100.0	100.0	100.0

**Table 2** Crosstabulation between bruxism and three types of occlusal interferences

Type of interference		Bruxer (%)	Non-bruxer (%)	P.value
Co- CR Discrepancy	Yes	89.3	74.2	0.137
	No	10.7	25.8	
Non working side Interference	Yes	71.4	48.4	0.072
	No	28.6	51.6	
Protrusive Interference	Yes	46.4	19.4	0.026*
	No	53.6	80.6	

\* Significant

ences in this 59 sample is presented in table 2. The results showed that statistically significant relationships existed between bruxism and some prematurities such as protrusive interferences ( $p=0.026$ ), but this relationships were not statistically significant for CR and other eccentric interferences ( $p>0.05$ ).

### Discussion

Different methods are suggested to record bruxism in epidemiologic studies [22]. One method is the evaluation of dental attrition from direct visual observation in the mouth [23] from dental study casts [24], and another method uses participants' self report of bruxism [25]; in some studies special devices are used [26]. Although there is inadequate support for the use of the participants' report of bruxism as a diagnostic tool, the questionnaire has been used in epidemiologic studies in which the association between bruxism and temporomandibular joint pain or tooth wear was investigated [27]. The principal advantage of the questionnaire is that it can be applied to a large population, though the information on bruxism activity is subjective in nature [24]. The previous studies reported that approximately 8 to 20% of the population are aware of bruxism [28-29]. These two separate studies have used questionnaire and interviews related to oral parafunctions. Ciancaglini et al have found a higher prevalence (31.4%) of self reported grinding and/or clenching of the teeth in a sample of 438 adult patients [30].

Dental attrition can be caused by many factors other than bruxism [31]. Another remarkable point is the timing of the attrition, because there is a risk of recording no bruxism when subjects have recently begun bruxism and may not show signs of wear or, on the other hand, maybe the bruxism has stopped, but attrition is observed [32]. The reliability of using only the evaluation of dental attrition is controversial [33]. Therefore in this study a combination of methods was used to classify a sample of 59 subjects into 2 groups of bruxers and nonbruxers by a simple YES/NO questionnaire concerning the awareness of bruxism and also an intraoral clinical examination.

The role of occlusal interferences as an etiologic factor in bruxism has been a continuous issue for many years. The results of this study demonstrate that the association between the bruxism and protrusive premature occlusal contacts was statistically significant and for the other premature ties in centric relation and nonworking side, the relations-hip was not statistically significant. In working side, no prematurity was found in 59 subjects by visualizing the contacts from the buccal side. The findings of this study are in agreement with those of the previous studies. William-son's classic study [15] and the that of Ramfjord [14] showed the causal relationship between eccentric occlusal interferences and muscle hyperactivity and found that a marked reduction in muscle tones and action follows the elimination of occlusal disharmony.

Dawson's experience has shown that signs and symptoms of eccentric bruxism seem to disappear completely with careful elimination of all occlusal interferences. According to Dawson, occlusal interferences can cause parafunctional movements which had not existed before the interference and by invasion to the envelope of function, delete mechanism is predictable [34]. Other studies don't support the concept that occlusal contacts cause bruxing events [16-19, 35-36]. Currently, one thing seems certain, bruxism is multifactorial in nature and there is no single treatment that is effective for eliminating or even reducing all bruxing; optimal strategies depend on proper diagnosis. Therefore, further studies are necessary to evaluate the relationship between bruxism and occlusal interferences as causative or contributing factors with larger sample sizes. It is of great importance to examine sex differences in bruxism in response to occlusal interferences. In this study no statistically significant sex difference was determined among the subjects in the bruxing group. Limitations of this study include the use of self report questionnaire and intraoral examination which may not accurately detect the presence of bruxism, and also recording the working side interferences which were done on the buccal side by visual observation.

## Conclusion

Within the limitations of this study, the following conclusions were drawn:

1. Findings of this study suggest a statistically significant association between the bruxism and protrusive premature occlusal contacts.
2. There is no statistically significant relationship between bruxism and occlusal interference in centric relation and nonworking side lateral movements.
3. No statistically significant sex difference could be found in bruxing.

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