

The Relationship Between Bruxism and Occlusal Factors Among Seven- to 19-Year-Old Turkish Children

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Abstract: The aim of this study was (1) to investigate the relationship between occlusal factors and bruxism among 965 Turkish subjects (472 boys and 493 girls) with a mean age of 12.8 years (range, seven to 19 years); and (2) to identify possible sex differences between girls and boys. This sample was divided into two groups of bruxers or nonbruxers based on a clinical examination and self-reports. The examiner recorded the Angle molar classification bilaterally, severity of anterior crowding, existence of anterior and posterior crossbite, open and deep bite, functional shift, and excessive overjet. The relationships between occlusal factors and bruxism and sex differences between boys and girls were evaluated with chi-square analysis (χ^2) using the SPSS software package. The results showed that bruxism was diagnosed in 12.6% of all subjects. The evaluation of the findings indicated that no statistically significant relationships were determined between bruxism and occlusal factors. No sex differences were found between occlusal factors in relation to bruxism. The prevalence of bruxism in boys and girls was similar, and no statistically significant differences were found. It is concluded that none of the occlusal factors seem to play a role in the development of bruxism. However, additional longitudinal studies with larger samples need to be conducted to determine if there is any relationship between occlusal factors and bruxism. (*Angle Orthod* 2004;74:672–676.)

Key Words: Bruxism; Turkish; Occlusal factors

INTRODUCTION

Bruxism may be defined as purposeless rhythmic, habitual tooth clenching or grinding movements that may occur either when awake or during sleep.¹ Habitual tooth pressing or clenching has been termed diurnal bruxism, whereas tooth grinding, which usually occurs during sleep, has been called nocturnal bruxism.¹

The etiology of bruxism has been attributed to systematic factors, such as intestinal parasites, subclinical nutritional deficiencies, allergies, and endocrine disorders^{2,3} to local factors, especially malocclusion,^{4,5} and to psychological

factors.^{6,7} Ramfjord and Ash⁸ stated that there are three mechanisms that interact to trigger bruxism, ie, emotional tensions, pain or discomfort, and occlusal maladjustments. Nadler² emphasized the causes of bruxism as local, systemic, psychological, and occupational. Meklas⁹ believed that psychogenic and local irritation factors such as orthodontic malocclusions outweighed other causes of bruxism.

The prevalence of signs and symptoms of temporomandibular disorders are described in the literature for various worldwide ethnic groups. However, few studies have attempted to survey the occlusal factors in relation to bruxism. It would be useful to know this relationship in order to prevent bruxism developed by occlusal disorders.

Nilner¹⁰ studied the relationship between occlusal factors and parafunctional activities in 440 children aged seven to 14 years. Statistically significant relationships were found between Class II and Class III malocclusion and bruxism. Widgorowicz-Makowerowa et al¹¹ examined 2100 children (10 to 15 years old) and found statistically significant differences in the prevalence of bruxism between children with and without malocclusion, but the type of malocclusion was not defined in the study.

The aim of this study was (1) to investigate the relationship between occlusal factors (such as Angle classification of molars, anterior and posterior crossbites, excessive over-

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TABLE 1. Number of Female and Male Subjects by Age Group

	Age Groups				Total
	7–9 yr	10–12 yr	13–15 yr	16–19 yr	
Female subjects	132	129	144	88	493
Male subjects	117	125	106	124	472
Total	249	254	250	212	965

jet, open and deep bite, functional shift, and anterior crowding) and bruxism among seven- to 19-year-old Turkish subjects; and (2) to identify possible sex differences between male and female subjects.

MATERIALS AND METHODS

A total of 965 pupils (472 boys and 493 girls) were selected randomly from four different schools in Konya, Turkey. The mean age for the total sample group was 12.8 years (range, 7–19 years). The mean age was calculated as 12.9 ± 4.1 years for boys and 12.7 ± 3.9 years for girls.

The distribution of age for all participants is shown in Table 1. The following inclusion criteria were used for the selection of the sample.

- Seven years of age or older
- All permanent first molars erupted
- Caucasian

The examiner recorded the Angle classification for molars bilaterally, severity of anterior crowding, existence of anterior and posterior crossbite, open and deep bite, functional shift, and excessive overjet.

Four mutually exclusive anteroposterior (A-P) molar relationship groups were established: (1) Class I, (2) Class II division 1, (3) Class II division 2, and (4) Class III. Crossbites were designated as either present or absent. Anterior and posterior crossbite was recorded as a single tooth or multiple teeth. More than five mm of anterior crowding was designated as anterior crowding present. Overjet or the horizontal distance between the facial surface of the upper central incisors and the facial surface of the lower central incisors was recorded using a periodontal probe. Overjet exceeding six mm was recorded as extreme overjet.

The process of diagnosing a functional shift in occlusion consisted of deconditioning the subject's habitual biting pattern, thus making it possible to measure any functional shift of the mandible. In this way any functional shift caused by an occlusal interference resulting in a reflex alteration in the movement pattern at the occlusal interface was detected. Deconditioning was accomplished using cotton rolls to separate posterior teeth for three minutes before any measurement of a functional shift was attempted.

Similarly, three groups were derived from the overbite data:¹² (1) open bite (negative overbite), (2) deep bite (overbite greater than the lower incisor crown's height), and (3)

TABLE 2. The Distribution of Bruxism in Seven- to 19-Year-Old Turkish Subjects

	Bruxism			
	Present	Absent	Total	%
Boys	61	411	472	12.92
Girls	61	432	493	12.37
Total	122	843	965	12.64

overbite less than the total overlap of the lower incisor's crown.

The study was conducted using bruxing and nonbruxing subjects. Subjects were divided into two groups of bruxers or nonbruxers as determined by the clinical examination and self-report. The subjects were characterized based on answers to several questions related to them or their families and to their awareness of their teeth clenching or grinding. A clinical examination of signs and symptoms of bruxing was also important. 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) bruxing currently or heard to brux by parents or someone else; and (3) confirmation of bruxism by the principal investigator with an intraoral examination (presence of wear facets on teeth; grade 0, no wear facets; grade 1, enamel only; grade 2, enamel and dentin; grade 3, wear of the cusp). The nonbruxist sample was selected based on the subjects answering "no" to all inquiries regarding clenching or grinding their teeth, as well as an intraoral examination that ruled out obvious signs of bruxing (grade 2 or 3 of the presence of wear facets on at least four teeth).

All statistical analyses were performed using the SPSS software package (SPSS for Windows 98, version 10.0, SPSS Inc, Chicago, Ill). The relationship between bruxism and occlusal factors was evaluated with chi-square analysis (χ^2). Chi-square analysis was also performed to compare the changes observed in male and female samples.

RESULTS

The evaluation of the results showed that bruxism was registered in 12.6% of all subjects. It was determined that 12.4% of girls and 12.9% of boys have bruxism. The distribution of bruxism in seven- to 19-year-old Turkish subjects is presented in Table 2. The results indicate that the prevalence of bruxism in boys and girls is similar, and no statistically significant differences were found in this population ($P > .05$).

The distribution of different occlusal factors in seven- to 19-year-old Turkish subjects is presented in Table 3. The results showed that no statistically significant relationships existed between bruxism and occlusal factors, such as Angle classification for molars, severity of anterior crowding,

TABLE 3. Prevalence of Different Occlusal Factors Among Seven- to 19-Year-Old Turkish Subjects

Occlusal Factors	n	%
Angle Class I	737	76.40
Angle Class II division 1	153	15.90
Angle Class II division 2	41	4.20
Angle Class III	34	3.50
Anterior crossbite	52	5.40
Posterior crossbite	92	9.50
Excessive overjet	168	17.40
Open bite	79	8.20
Deep bite	211	21.90
Functional shift	11	1.10
Anterior crowding	179	18.50

existence of anterior and posterior crossbite, open and deep bite, functional shift, and excessive overjet (Table 4).

Sex differences between occlusal factors and bruxism are shown in Table 5. No sex differences were found between occlusal factors in relation to bruxism.

DISCUSSION

Different techniques are suggested to record bruxism in epidemiologic studies.¹³ One technique is the evaluation of dental attrition, from direct visual observations in the mouth,¹⁴ from dental study casts,¹⁵ or from occlusal appliances. However, it is very difficult to be sure if the bruxing is a consequence of parafunctional or functional habits.¹⁶ Because the occlusal surfaces are worn physiologically in

TABLE 4. The Relationship Between Different Occlusal Factors and Bruxism

Occlusal Factors	Bruxism ^a		
	n	χ^2	Significance
Angle Class I malocclusion	92	0.789	NS
Angle Class II, division 1 malocclusion	19	0.928	NS
Angle Class II, division 2 malocclusion	6	0.695	NS
Angle Class III malocclusion	5	0.712	NS
Anterior crossbite	7	0.855	NS
Posterior crossbite	8	0.231	NS
Excessive overjet	24	0.481	NS
Open bite	9	0.727	NS
Deep bite	22	0.273	NS
Anterior crowding	21	0.685	NS

^an, Sample size; χ^2 , chi-square value; NS, not significant.

TABLE 5. Gender Differences Between Occlusal Factors in Relation to Bruxism

Occlusal Factors	Sex	Bruxism ^a		
		n	χ^2	Significance
Angle Class I malocclusion	Female	47	0.528	NS
	Male	45		
Angle Class II, division 1 malocclusion	Female	11	0.369	NS
	Male	8		
Angle Class II, division 2 malocclusion	Female	1	0.157	NS
	Male	5		
Angle Class III malocclusion	Female	2	0.274	NS
	Male	3		
Anterior crossbite	Female	3	0.368	NS
	Male	4		
Posterior crossbite	Female	5	0.539	NS
	Male	3		
Excessive overjet	Female	14	0.366	NS
	Male	10		
Open bite	Female	6	0.519	NS
	Male	3		
Deep bite	Female	10	0.533	NS
	Male	12		
Anterior crowding	Female	12	0.256	NS
	Male	9		

^an, Sample size; χ^2 , chi-square value; NS, not significant.

the deciduous dentition, the reliability of using only the evaluation of dental attrition is controversial.¹⁷ Another remarkable point is the timing of the attrition because there is a risk of recording no bruxism when the subjects have recently begun bruxism and may not show signs of attrition.¹⁷ The same risk exists if bruxism has stopped, but attrition is observed.¹⁸ Also, dental wear can be caused by many factors other than bruxism.¹⁹ Therefore, in this study the bruxism history was obtained by a combination of methods. Interview of the children and clinical examination were carried out by the clinician.

The prevalence of bruxism is difficult to determine because the activity is performed subconsciously and questioning alone without a clinical examination is therefore unreliable. Studies by questionnaire, however, have reported that approximately 15–20% of people are aware of bruxing or habitually clenching their teeth.¹ Reports of the prevalence of bruxism vary, ranging from 5% to 96% of the population.^{20,21}

Egermark-Erikson et al²² reported a high prevalence of bruxism and of subjective symptoms and clinical signs of mandibular dysfunction in seven, 11, and 15-year-old children. In this study, the prevalence of bruxism was 13.27% among seven- to 19-year-old Turkish subjects. In addition, the results indicated that the prevalence of bruxism was similar in boys and girls.

In this study, bruxism was considerably less common than reported by Lindqvist.^{23,24} She based her assessment on the presence of wear facets on the teeth and found an incidence of about 50% in 12-year-old children, although only 15% of the parents reported bruxism in their children. The findings of this study are more in agreement those studies of adults in which bruxism was recorded based on the subject's own appraisal.^{25,26} However, people are often unconscious of their bruxism, and the occurrence is undoubtedly higher than that reported in the answers to questionnaires.

Henrikson et al²⁷ indicated that bruxism was higher in the Class II malocclusion group than in the normal group, which suggests a relationship between parafunctions and orthodontic malocclusion. Nilner¹⁰ studied the relationship between occlusal factors and bruxism and found statistically significant correlations between Class II and Class III molar relationships and bruxism. Carlsson et al²⁸ indicated that Angle Class II malocclusion and tooth wear in childhood predicted increased tooth wear in adulthood. However, Clarke²⁹ asserted that occlusal factors are not involved in the etiology of bruxism. Gunn et al³⁰ found no statistically significant relationship between any type of morphologic malocclusion and tooth clenching and grinding. In this study we also found that the molar relationships were not related to bruxism in both the mixed and permanent dentitions. The current findings are in accordance with Clarke²⁹ and Gunn et al.³⁰

In another study, Nilner³¹ examined the relationship be-

tween occlusal factors and bruxism in 309 adolescents. A statistically significant correlation was reported between deep bites and clenching and dental wear. Nilner³¹ also asserted the need for occlusal treatment in young people with occlusal interferences combined with oral parafunctions. Bailey and Rugh³² showed that occlusal adjustments do not stop bruxism. Brandt³³ studied the associations between morphological malocclusion and bruxism in 1342 children and adolescents aged six to 17 years. Significant associations were found among molar relationship, excessive overjet, overbite, and bruxism. Sari et al¹⁷ found statistically significant relationships among overjet > 6 mm, negative overjet, overbite, open bite, and bruxism in the permanent dentition. The same investigators also found relationships among Angle Class I occlusion for the first molar teeth, overjet > 6 mm, overbite > 5 mm, scissor bite, crossbite for anterior-posterior multiple teeth, and bruxism in the mixed dentition. In contrast to Nilner,³¹ Egermark-Erikson³⁴ indicated that children with deep bite had less worn teeth than other children. In this study, no statistically significant relations were found between bruxism and severity of anterior crowding, existence of anterior and posterior crossbite, open and deep bite, functional shift, or excessive overjet.

Currently, it is widely accepted that temporomandibular disorders are multifactorial in nature and more prevalent in female subjects than in male subjects.^{35–39} Therefore, to elucidate the causes or relationships of bruxism, it is of great importance to examine sex differences in bruxism in response to the occlusal factors. Egermark-Eriksson et al²² stated that there were no significant differences between the sexes in the occurrence of bruxism. Similarly, in this study, no statistically significant sex differences were determined among the seven- to 19-year-old Turkish population.

CONCLUSIONS

Based on the results obtained, it can be concluded that

- The data obtained from the physical examination and questionnaire identified no statistically significant relations between bruxism and all occlusal factors investigated in seven- to 19-year-old Turkish subjects. No evidence that the occlusal factors studied play a role in the development of bruxism was found.
- No statistically significant sex differences were found between different occlusal factors and bruxism.
- There is a need for further longitudinal investigations with larger sample sizes to know if there is a relationship between occlusal factors and bruxism.

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