Prevalence of Bruxism and Associated Correlates in Children as Reported by Parents

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ABSTRACT

Purpose: The purpose of this study was to determine the prevalence of childhood bruxism and associated correlates, as reported by parents.
Methods: A cross-sectional survey of parents was conducted at 4 private pediatric dental offices and the Children's Hospital Boston Dental Clinic. Data were gathered via a self-administered questionnaire offered to the parents of children under age 17. Factors were evaluated for association with bruxism using chi-square tests and multivariate logistic regression.
Results: Based on 854 surveys analyzed, the children's mean age was 8.1 years and 52% were female. Caucasians represented 87% of the population, and 90% of the parents had attained a high school diploma. The overall prevalence of reported bruxism was 38%. Five percent of the parents reported that their children had subjective symptoms of temporomandibular disorder (TMD); however, these were not associated with reported bruxism. A child with a psychological disorder had a 3.6 times greater likelihood of bruxism. If either parent had a history of bruxism, their child was 1.8 times more likely to brux. If bedroom doors were open, parents reported bruxism 1.7 times more often. Children who drooled at night were 1.7 times more likely to brux, while sleeptalking children were 1.6 times more likely to brux.
Conclusions: (1) Of the 38% of parents reporting that their children brux, familial history, open bedroom doors, drooling, sleeptalking, and psychological disorders were significantly associated with the reported bruxism. (2) While 5% of parents reported that their children had at least one TMD symptom, no TMD symptoms were associated with reported bruxism.
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KEYWORDS: BRUXISM, CHILDREN, TEMPOROMANDIBULAR DISORDER

Concerned parents often confront pediatric dentists with questions regarding their children's night-time grinding habit. They inquire about its causes, prevalence, and long-term sequelae. It is important for pediatric dentists to be informed about the current state of knowledge regarding bruxism in children. In addition, further research is needed to understand the significance of bruxism in children.

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Bruxism is one of a number of parasomnias—undesirable physical events that occur predominantly during sleep, taking the form of motor or autonomic phenomena and associated with varying degrees of awakening.[1] Those common in children include: (1) muscle cramps; (2) enuresis; (3) colic; (4) drooling; (5) somniloquy (sleeptalking); and (6) sleepwalking. Typically, parasomnias are transient, but if frequent, they can impair sleep and, thus, daytime functioning.[1]

In a classic article, Reding et al defined bruxism as an interruption of the normal physiologic rest position of the mandible during sleep, resulting from the forceful, rhythmic contractions of the muscles of mastication.[2] This bruxing force can exceed the amplitude of maximum bite force during the day. Thus, bruxism is potentially harmful to oral health through the destruction of oral tissues, restored teeth, and dental prostheses.[3]

The prevalence of bruxism in the literature varies from 7% to 88% in children [4] and from 5% to 15% in adults.[5] While Reding et al used only a questionnaire to determine their prevalence of 15% in children,[2] Lindquist assessed bruxism with a short questionnaire and a clinical examination for wear facets. His study reported that, while 47% of children had atypical facets, only 15% of the children's parents reported audible grinding.[6] Due to differing methodologies in subsequent studies, the precise prevalence of bruxism is not known.

The etiology of bruxism is multifactorial. While several research articles attempted to determine if peripheral factors such as malocclusion or a developing occlusion were sufficient causes of bruxism, the results were inconclusive. In contrast, central neurological factors have been associated with bruxism. Using EEG (electroencephalogram) measurements, Kato and Rompre et al discovered a clear sequence of autonomic activation that preceded jaw motor activity in subjects with bruxism.[7] While stress, autonomic abnormalities, and medical issues have been associated with bruxism,[8] genetics play a role as well.[1,2,9,10]

Many researchers strived to scientifically substantiate a link between stress and bruxism. Vanderas et al established that stressed children had higher levels of urinary catecholamines and that these children had a higher prevalence of bruxism.[11] Numerous studies have validated the theory that bruxers respond more negatively to life events and tend to be more anxious, aggressive, and hyperactive.[4,5,8,10,14-21]

The purpose of this study was to determine the prevalence of bruxism and related factors in a sample of children and adolescents utilizing parental reporting.

METHODS

A cross-sectional survey of parents was conducted at 4 private pediatric dental offices in suburban Boston and at the Children's Hospital Boston, Boston, Mass. Data were gathered via a self-administered questionnaire that was distributed to the parents of children under the age of 17 at their recall appointments. To ensure anonymity, the questionnaire was self-explanatory to limit the interaction of parents with any staff. The Human Subject Protocol Institutional Review Board Application was approved by the Committee on Clinical Investigation of the Children's Hospital Boston.

The questionnaire asked parents about their child's history of day or night grinding, oral habits, subjective symptoms of temporomandibular dysfunction (TMD), and medical history. To determine if sleeping arrangements were related to bruxism reporting, the survey asked:

1. the number of times a parent checks on a child during the night;
2. the proximity of the parents' and child's bedrooms;
3. whether the doors of the parents' and children's rooms were open or closed.

Parents detailed parasomnias their children suffered from and provided sociodemographic information.

Lastly, the study investigated the possible effects of a child's general level of anxiety and stress on bruxism. Parents compared their child's ability to handle stress as being more, less, or comparable to peers, and anxiety levels were measured numerically from 1 to 5, with 5 being the most anxious.

Of the 1,000 surveys distributed to private offices and the dental clinic of the Children's Hospital Boston, 917 were returned. Only complete surveys (N=854) were included in the analyses.

STATISTICAL ANALYSIS

The prevalence of bruxism was calculated as the proportion of all respondents who reported that their child audibly ground their teeth during the day or night and the corresponding 95% confidence interval using the large sample approximation to the binomial. Chi-square tests of association were used to examine the association between bruxism and a variety of factors hypothesized to influence the condition. Multivariate logistic regression examined the simultaneous influence of factors associated with bruxism with a *P* value of .30 or less in the univariate analyses and those that were described as associated in the literature. This model was reduced until only variables whose odds ratios were significant at the 0.05 level remained. Data were analyzed using SPSS for Windows Version 11.0 (SPSS Inc, Chicago, Ill)

RESULTS

The mean age of the patients surveyed was 8.1 years (median=7.7 years; range=1.4 to 16.9 years) and 52% (432/831) were female (Table 1). The vast majority of the children in this study were Caucasian (87%, 730/841) and had well-educated parents (90%, 756/841 greater than high school).

Table 1. Demographic Characteristics of Study Population

	N	%
Gender		
Female	432	52
Age (ys)		
<3	17	2
3<6	250	31
6<12	421	51
12-16	132	16
Race		
White, non-Hispanic	730	87
African American, non-Hispanic	42	5
Hispanic	24	3
Asian	22	2
Other	23	2
Parent/guardian education		
High school diploma or less	85	10
Some college	219	26
Four years college	312	37
Graduate school	225	27

Table 2. Bruxism History of Reporter and Child, Oral Habit, and TMD Symptoms of Study Population

	N	%
Bruxism history		
Positive for bruxism	314	38
Parental history		
Neither grinds	411	60
Both grind	257	37
Either grinds	18	3
TMD symptoms		
Jaw clicking	13	2
Jaw tenderness	12	1
Jaw pain	11	1
Limited opening	7	<1
Oral habits		
Pacifier	369	43
Nail biting	224	26
Thumb/finger sucking	188	22
Lip biting	57	7

Table 3. Medical History, Stress Response, and Anxiety Level of Study Population

	N	%
Health history		
Allergies	260	31
C-section delivery	216	25
Frequent ear infection	178	21
Asthma	109	13
Other condition	89	10
Premature birth	78	9
Frequent headaches	61	7
ADD/ADHD	57	7
GI disorder	31	4
Neurological disorder	25	3
Psychological disorder	19	2
Stress response		
Same as peers	510	61
Better than peers	204	25
Worse than peers	119	14
Anxiety level		
1, 2	453	54
3, 4, 5	381	46

The overall prevalence of sleep bruxism was 38% (314/833; Table 2). Bruxism was reported to commence at a mean age of 3.6 years and ceased at a mean age of 6 years. Only 44% (53/127) of the parents who reported bruxism questioned a dentist about the issue. Thirty-seven percent (257/686) of the children had parents who both bruxed, while 60% (411/686) had at least 1 parent who bruxed.

Only 5% (43/852) of the study population reported subjective TMD symptoms such as jaw clicking (2%, 13/854), muscle tenderness (1% 12/853), pain on opening (1%, 11/852), or limited opening (<1%, 7/853). Reported oral habits included: pacifier (43%; 369/853), nail-biting (26%, 224/853), thumb-sucking (22%, 188/853), and lip-biting (7%, 57/853).

Allergies afflicted almost one third (260/851) of all the children, while 25% (216/851) of respondents reported that their child was born via Caesarean section delivery (Table 3). Other common conditions reported within this population include frequent ear infections (21%, 178/851), asthma, (13%, 109/851), and attention deficit disorder with hyperactivity (ADHD; 7%, 57/851). The majority of surveys (86%, 714/833) indicated that the children had either the same or a better stress response than their peers. While the mean anxiety level was 2.4 out of 5, almost half of the children had an anxiety level of 3 or greater (5 being the most anxious).

Table 4. Familial Sleeping Arrangements and Parasomnias of Study Population

	N	%
Sleep history		
No. of times checked on child		
0-1	515	62
2+ 322	38	
Proximity of rooms		
Next door	397	47
Down the hall	332	39
Different floor	81	10
Same room	36	4
Status of bedroom doors		
Both doors open	630	75
Either door open	140	17
Neither door open	71	8
Parasomnias		
Drooling	279	33
Sleeptalking	137	16
Bed-wetting	81	10
Colic	75	9
Sleepwalking	59	7
Excessive daytime sleepiness	30	4

A large portion of the parents' and child's bedrooms were either next door (47%, 397/846) or down the hall (39%, 332/846) from each other (Table 4). In addition, 75% (630/841) of both the child's and parents' doors remained open at night. The mean number of times that parents checked on their child during the night was 1.4, and 38% (322/837) inspected their child's room more than twice at night. One third (279/851) of the children had a drooling habit, while 16% (138/856) talked during sleep (ie, somniloquists).

Tables 5 to 8 compare the study variables between bruxing and nonbruxing children. There was a trend for males to be more likely to brux than females (P=.05; Table 5). Fifty-three percent of the bruxing population was male, whereas only 45% of nonbruxers was male. There was no statistically significant difference between bruxers and nonbruxers regarding age, race, or parental education level.

No relationship was found between TMD symptoms and bruxism (Table 6). There was a statistically significant association between the child's bruxism habit and parental bruxism (P≤.0005). Forty-eight percent of children reported to be bruxers had at least one parent who also had a history of bruxism, which was true for only 32% of reported nonbruxers. Although not reaching nominal significance, there was a trend for thumb/finger sucking to be negatively associated with bruxism (ie, those children who bruxed were less likely [19%] to suck their thumbs or fingers compared to 24% of nonbruxers (P=.06).

Bruxers had a worse stress response than nonbruxing children (P=.04; Table 7). Similarly, bruxers were significantly more likely to have higher reported anxiety levels (P=.002). Although not reaching nominal statistical significance, there was a trend for bruxers to have a higher reported history of a psychological disorder (P=.05).

Table 5. Comparison of Demographic Characteristics of Bruxers and Nonbruxers

	Bruxism – Yes (N=314) Column %	Bruxism – No (N= 519) Column %	P
Gender			.05*
Male	53	45	
Age			.45
<3 years	3	2	
3<6	33	30	
6<12	50	52	
12-16	14	17	
Race			.13
White, non-Hispanic	85	89	
Other	15	11	
Education of parent 1			.87
<4 college	35	36	
≥4 college	65	64	

*P<.05 and, therefore, significant.

Bruxism was reported more often if both the parents' and child's doors were open during bedtime (P=.001; Table 8). If parents checked on their child more often throughout the night, they also had an increased reporting of the habit (P=.03). Of the investigated parasomnias, bruxing children drooled more frequently (P≤.0005) and were more often somniloquists (P=.003).

In the reduced multivariate logistic regression analysis, a child with a psychological disorder had a 3.6 times greater likelihood of bruxism (Table 9). If either parent bruxed, his/her child was 1.8 times more likely to be a bruxer. Also, when the bedroom doors were open, parents were 1.7 times more likely to report bruxism. Two parasomnias were associated with a tendency to brux: droolers were 1.7 times more likely to have the habit, and somniloquists were 1.6 times more apt to brux.

DISCUSSION

This study's primary goal was to establish the prevalence of bruxism in children. To ensure consistency with the historical research, the authors chose not to differentiate between nighttime and daytime grinding. In fact, the incidence of day grinding was less than 1% of the population studied. The finding that 38% of the children were reported to brux is higher than the 15% reported by Reding et al.[2] Lindquist also reported a 15% prevalence; however, he found that 47% of the children had clinically evident atypical wear facets.[6] Kuch et al used both a parental questionnaire and clinical exam in establishing a prevalence; they noted a bruxism prevalence of 15%

Table 6. Comparison of Bruxism History of Reporter and Child, Oral Habits, and TMD Symptoms Between Bruxers and Nonbruxers

	Bruxism – Yes (N=314) Column %	Bruxism – No (N= 519) Column %	P
Parental bruxism history			≤.0005*
Both parents grind	2	3	
Either parent grinds	48	32	
Neither parent grinds	50	65	
TMD symptoms			
Jaw clicking	2	1	.25
Jaw tenderness	2	1	.38
Jaw pain	2	1	.60
Limited opening	2	<1	.06
Oral habits			
Pacifier	43	44	.79
Nail biting	26	26	.80
Thumb/finger sucking	19	24	.06
Lip biting	7	6	.44

*P<.05 and, therefore, significant.

Table 7. Comparison of Medical History, Stress Response, and Anxiety Level Data Between Bruxers and Nonbruxers

	Bruxism – Yes (N=314) Column %	Bruxism – No (N=519) Column %	*P*
Health history			
Allergies	32	30	.45
C-section delivery	24	26	.44
Frequent ear infection	21	22	.66
Asthma	12	13	.75
Premature birth	8	10	.33
Frequent headaches	9	6	.22
ADD/ADHD		7	.38
GI disorder	4	4	.90
Neurological disorder	4	2	.20
Psychological disorder	4	2	.05
Stress response			.04*
Same as peers	60	66	
Better than peers	22	26	
Worse than peers	18	12	
Anxiety level			.002*
1, 2	48	58	
3, 4, 5	53	42	

*P<.05 and, therefore, significant.

Table 8. Comparison of Familial Sleeping Arrangement and Child Parasomnias Between Bruxers and Nonbruxers

	Bruxism – Yes (N=314) Column %	Bruxism – No (N=519) Column %	*P*
Sleep history			
No. of times checked on child			.03*
0-1	57	65	
2+	43	35	
Proximity of rooms			.19
Next door	44	48	
Down the hall	40	40	
Different floor	10	9	
Same room	6	3	
Status of bedroom doors			.001*
Both doors open	81	71	
Either door open	12	19	
Neither door open	7	10	
Parasomnias			
Drooling	42	27	≤.0005*
Sleeptalking	21	13	.003*
Bed-wetting	12	8	.10
Colic	11	8	.08
Sleepwalking	9	6	.07
Excessive daytime sleepiness	4	3	.87

*P<.05 and, therefore, significant.

Table 9. Logistic Regression, Odds Ratios (95% CI)

	Univariate model	Multivariate model
Psychological disorder	2.3 (0.9, 5.9)	3.6 (1.2, 10.9)
Parental bruxism	1.9 (1.3, 2.6)	1.8 (1.3, 2.6)
Drooling	2.0 (1.5, 2.7)	1.7 (1.2, 2.5)
Doors open	1.8 (1.3, 2.5)	1.7 (1.1, 2.5)
Sleeptalking	1.7 (1.2, 2.5)	1.6 (1.0, 2.5)

from the surveys. Their clinical exams, however, revealed an additional 15% who had evidence of bruxism without parental knowledge of the habit.[13]

Other studies found estimates that were higher than the 15% reported by Reding et al.[2] Barthlen and Stacy stated that 90% of the general population occasionally grinds their teeth, while 50% of children also have the habit.[15] Archbold et al reported that 38% of the children surveyed from general pediatric clinics had symptoms of 1 of 3 parasomnias (sleep terrors, sleepwalking, or bruxism).[22] In a literature review, Cash found a large range of prevalence values reaching 88%.[4] Most of the studies' reported rates, however, were similar to the 15% prevalence reported by Reding et al.[2]

The fact that the current study's percentage of bruxism was higher than most previous reports could be due to a number of factors. The surveys were filled out at pediatric dental offices by predominantly well-educated parents who most likely had an increased awareness and interest in oral health and disease. This bias, however, may have resulted in a more accurate estimate of the prevalence of bruxism among children. Therefore, the 38% value may be a more accurate prevalence than prior reported values.

Consistent with other studies, the authors found no statistically significant gender effect on the prevalence of bruxism. While this study found no racial influence on bruxism, it must be noted that this study population was disproportionately Caucasian. In a large, controlled epidemiologic study, Laberge et al found that no sociodemographic variables played a role in the occurrence of parasomnias.[19]

This study was the first to explore whether familial sleeping arrangements affected the parental reporting of bruxism and, in fact, an association was found. Parents who checked on their children often and/or slept with doors open were more likely to observe and, thus, report bruxism. Strangely, the proximity of the bedrooms did not affect the reporting of bruxism. Simply having doors open may be sufficient to de-

tect the habit due to the loud and distinctive sound of bruxism. This study's finding of a 38% prevalence of bruxism may, therefore, be an underestimate. If all of the parents, rather than the three quarters in this study, checked on their children throughout the night and/or had both doors open, the prevalence of bruxism may have been higher.

The authors found that if either of the child's parents had a history of bruxism, that child was almost twice as likely to brux. Other studies also reported a positive familial history with bruxism, thus corroborating this study's finding.[1,2,9,10]

The present study, which included children under age 17, found that only 5% of parents reported that their child had TMD symptoms. This prevalence is similar to that reported in a 1992 American Academy of Pediatric Dentistry survey, which reported that 7% of children younger than 10, had TMD symptoms.[24] The authors found that those children with indicators of TMD were not at higher risk for bruxism. In contrast, several studies suggested that early intervention may help to reduce the incidence of TMD later in life.[12,17,25-27] More long-term studies are required to determine the association between childhood parafunctional habits and the development of future TMD.

While no other studies examined the relationship between oral habits and bruxism, the univariate analyses demonstrated a trend for thumb-sucking children to be less likely to brux. It seems logical that when a child sucks a digit at night, he/she is unable to brux without injury and awakening. The fact that children without oral habits have a higher prevalence of bruxism also suggests that bruxism may arise as an alternative method to relieve stress. By either sucking digits or grinding their teeth, children may have the ability to comfort themselves.

This study found only 1 significant association between a child's medical history and bruxism. Children with a psychological disorder had a higher prevalence of bruxism when compared to nonbruxers. Other researchers found relationships of bruxism with allergies[8] and headaches.[28] Conversely, Weideman et al found that bruxers tended to be healthier than their habit-free counterparts.[1] Within this study's population, both bruxers and nonbruxers had an equivalent risk of either being healthy or having disease.

In the univariate analyses, the authors found that both stress and anxiety triggered a higher probability of bruxism. Although ideal circumstances would have included an existing psychological test of childhood anxiety and stress, the authors wanted to use a simple subjective scale. The authors believed that limiting the length of the questionnaire would ensure both participation in and completion of the survey during the child's recall visit. It is unclear whether bruxism is simply a manifestation of tension and/or if bruxism serves as a release. This finding is in accordance with most researchers, who report that children who brux tend to be more tense and handle stressful situations poorly.[4,5,8,10,11,14-17,19-21]

In the multivariate regression analyses, anxiety and stress correlated strongly with psychological disorders or sleeptalking; therefore, stress and anxiety did not enter into the final model. In addition, the strong relationship between thumb-sucking and high stress/anxiety eliminated thumb-sucking from the final multivariate model. The multivariate analysis demonstrated a significant link between psychological disorders and bruxism. The large confidence interval of children with psychological disorders reflected the low number of responders to this item on the survey.

Similarly, Ohayon et al found that depressive disorders were more common in those children who bruxed.[20] Furthermore, Restrepo et al effectively reduced the signs of bruxism in the primary dentition by utilizing the 2 different psychological techniques of directed muscular relaxation and competence reaction. With a statistically significant decrease in both bruxism and anxiety, they found that psychological status factored into an increased risk of bruxism.[21]

Corroborated by various studies, this study's investigation found that the parasomnias of sleeptalking and drooling were associated with bruxism. Similar to this study's results, Weideman et al noted that those children who had somniloquy and drooling habits while sleeping were at an increased risk for bruxism.[1] This association is logical, since, as Laberge et al noted, both sleeptalking and bruxism involve orofacial musculature.[19] The fact that children who drool have a higher prevalence of bruxism lends credibility to Kato and Thie et al's theory that bruxism serves to temporarily increase salivary flow to lubricate oral and esophageal structures.[10] Logically, any "excess" saliva would seep from the mouth.

This study utilized a parental questionnaire to obtain the prevalence of bruxism. Hence, it may not have obtained the actual prevalence of this habit. A longitudinal, large-scale clinical study to inspect for wear facets, which would be clinical proof of significant bruxism, is both cost prohibitive and logistically challenging. In addition, facets do not indicate active bruxism, but rather a history of bruxism.[9] Moreover, it is unclear whether the facets are a consequence of a parafunctional or a functional habit. This problem is especially true in the primary dentition, since the occlusal surfaces easily wear with normal use.[27]

Nonetheless, this study's questionnaire provided an effective manner to gather prevalence data of bruxism in children from a large sample size. There are several deficiencies, however, when utilizing a questionnaire. Parents may be reluctant to admit the existence of a problem such as bruxism, or they may be unaware of the habit when it actually exists.[2] Also cross-sectional surveys can only identify associations and not causal relationships.

This study attempted to obtain the most representative sample of the population. The varied locations of the suburban private offices and the Children's Hospital Dental Clinic potentially allowed for parental responses from assorted socioeconomic backgrounds. Massachusetts Medicaid covers approximately 70% of the patients treated at the Children's Hospital Boston Dental Clinic, whereas the suburban practices were non-Medicaid populations. Despite these efforts, the majority of the respondents were well-educated Caucasians, which biased the data towards this socioeconomic class.

The multifactorial basis of bruxism was evident with familial history, drooling, sleeptalking, and psychological disorders being significantly associated with the habit. Thus, pediatric dentists can assess a child's risk for a bruxing habit based on parentally reportable factors.

CONCLUSIONS

Based on this study's results, the following conclusions can be made:

1. Of the 38% of parents reporting that their children brux, the following factors were significantly associated with the reported bruxism:
   a. familial history;
   b. open bedroom doors;
   c. drooling;
   d. sleeptalking;
   e. psychological disorders.
2. While 5% percent of parents reported that their children had at least one temporomandibular disorder symptom, no such symptoms were associated with reported bruxism.

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