

# Incidence of diurnal and nocturnal bruxism

Alan G. Glaros, Ph.D.\*

Wayne State University, Detroit, Mich.

Previous epidemiologic studies on the incidence of bruxism have typically attempted to determine the rate of bruxism in a number of populations. These studies have differed in the age of the sample (child versus adult) and the status of the subjects (dental patients versus student or general populations). As a result, the reported incidence of bruxism has shown substantial variability.

Among adults, for example, the rate of bruxism has been reported to be from 5.1% to 22.1%.<sup>1-5</sup> Among children, reported incidence ranges from 11.6% to 15.1%.<sup>2, 6, 7</sup> As might be expected, incidence rates for dental patients are typically higher than those reported for the general population.<sup>8</sup>

With few exceptions, incidence studies of bruxism have attempted to determine only the relative rates of bruxism. While this information may have important public health and education implications, a finer level of analysis would provide information on incidence rates and would be potentially useful in the study of the etiology of the disorders. Such an analysis might identify subpopulations of bruxists who would, in turn, benefit from differing treatment modalities. Identification of these subpopulations might also help stabilize reported incidence rates in future research.

Prior research<sup>9</sup> has suggested that bruxists may be divided into two categories: (1) nocturnal ("non-strain") grinders and (2) diurnal ("strain") clencher. Nocturnal grinders are "true" bruxists who grind rather than clench. They grind nocturnally, independent of psychologic stress, and have a higher incidence of bruxism in relatives. Diurnal clencher, on the other hand, clench rather than grind. They clench during the day, in response to stress, and have a low rate of bruxism among family members.

While a number of the hypotheses of Olkinu-

Table I. Incidence of bruxism

	N	%
Total sample	1,052	100.0
Nonbruxists	729	69.3
Bruxists	323	30.7
Exclusively diurnal		
Present	141	13.4
Past	126	12.0
Present or past	182	17.3
Exclusively nocturnal		
Present	35	3.3
Past	69	6.6
Present or past	79	7.5
Both diurnal and nocturnal		
Present	47	4.5
Past	51	4.8
Present or past	62	5.9

Table II. Incidence of bruxism by sex

	Overall N	Males (%)	Females (%)
Total sample	1,052	51.7	48.3
Nonbruxists	729	52.1	47.9
Bruxists	323	50.8	49.2
Exclusively diurnal			
Present	141	53.2	46.8
Past	126	59.5	40.5
Present or past	182	57.7	42.3
Exclusively nocturnal			
Present	35	28.6	71.4
Past	69	39.1	60.9
Present or past	79	36.7	63.3
Both diurnal and nocturnal			
Present	47	46.8	53.2
Past	51	47.1	52.9
Present or past	62	48.4	51.6

ora<sup>10-12</sup> were confirmed in an intensive examination of 69 bruxist patients matched for age and sex to 42 normal patients, additional tests of Olkinuora's hypotheses are warranted. Studies done to date using Olkinuora's conceptual framework have typically

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\*Associate Professor, Department of Psychology.

**Table III.** Incidence of bruxism and stress

	Overall N	Nervousness (%)	Anger (%)	Frustration (%)	Any stress (%)
Total sample	1,052	14.9	26.0	16.9	37.5
Nonbruxists	729	6.6	20.3	9.1	26.2
Bruxists	323	33.7	38.7	34.7	62.8
Exclusively diurnal					
Present	141	48.9	50.4	48.2	78.7
Past	126	38.1	46.0	42.1	71.4
Present or past	182	41.2	46.2	41.8	73.6
Exclusively nocturnal					
Present	35	14.3	5.7	14.3	25.7
Past	69	8.7	13.0	10.1	24.6
Present or past	79	10.1	12.7	10.1	25.3
Both diurnal and nocturnal					
Present	47	51.1	57.4	48.9	89.4
Past	51	45.1	51.0	49.0	80.4
Present or past	62	41.9	50.0	45.2	79.0

**Table IV.** Familial incidence of bruxism

	Overall N	Family (%)	Parents (%)	Siblings (%)
Total sample	1,052	29.0	11.8	18.2
Nonbruxists	729	24.7	9.5	14.8
Bruxists	323	38.7	17.0	25.7
Exclusively diurnal	182	37.4	19.2	22.0
Exclusively nocturnal	79	38.0	12.7	29.1
Both diurnal and nocturnal	62	43.5	16.1	32.3

relied on dental patients.<sup>4</sup> Since patients exhibit higher than normal probabilities of both dental and psychologic problems,<sup>8, 13</sup> the use of such subjects in epidemiologic studies tends to obscure etiologic factors and also tends to give an inaccurate picture of the "natural history" of the disorder.

This article, therefore, reports the results of a large-scale investigation of a normal adult (student) population in an examination of Olkinuora's hypotheses. In particular, the questions posed by this investigation in the examination of the relative rates of nocturnal and diurnal bruxism are:

1. What is the incidence of bruxism in the general population?
2. Do sex differences exist in bruxism incidence?
3. What percentage of bruxists and nonbruxists grind or clench their teeth in response to stress?
4. Do bruxists have a higher familial incidence of bruxism?

5. What self-reported symptoms correlate with bruxism?

6. How do bruxists become aware of their grinding and clenching habits?

## MATERIAL AND METHODS

A questionnaire was administered to 1,052 students at Wayne State University.\* Of this sample, 544 were men (51.7%), and 508 were women (48.3%). The mean age was 19 years (SD = 2.54).

The questionnaire was designed to elicit reports of both present and past clenching or grinding behaviors occurring during the day or during sleep. Additionally, the questionnaire attempted to elicit reports of clenching or grinding under a variety of emotional conditions. Nervousness, anger, and frustration were chosen as stressors, because a number of prior reports had indicated a relationship between bruxism and these factors.<sup>14-19</sup> Familial incidence as well as the effects of clenching or grinding were assessed.

## RESULTS

The data reported separate bruxists into three independent categories: (1) exclusively diurnal, (2) exclusively nocturnal, and (3) both diurnal and nocturnal. The third category, both diurnal and nocturnal, is *not* a summation of the first two categories. This category describes a subgroup of bruxists who report *both* diurnal and nocturnal bruxism rather than an exclusively nocturnal or diurnal pattern of clenching or grinding. Any subject

\*Copies of the questionnaire are available from the author.

who reported that he or she was currently clenching or grinding is included under the "Present" subcategory; any subject who reported that he or she engaged in clenching or grinding in the past is included under the "Past" subcategory. As Table I indicates, considerable overlap exists in these two subcategories. The "Present or Past" subcategory includes all subjects who reported either present or past bruxism. Additionally, since subjects were instructed to "circle all answers that apply" for a number of items, percentages reported in Tables II to IV may total more than 100%.

Except for Table I, all percentages are computed on the basis of the "Overall N" figure shown in the leftmost position in each row. Table I percentages are based on the total sample ( $N = 1,052$ ). Except where noted, all inferential statistics are based on the "Present or Past" subcategory.

Table I presents data on the incidence of clenching and grinding behavior, indicating that 30.7% of the sample reported either present or past nocturnal or diurnal grinding or clenching behavior. Present bruxists comprised 21.2% of the total sample. Of the present bruxist sample ( $N = 223$ ), 63.2% were exclusively diurnal, 15.7% were exclusively nocturnal, and 21.1% were both diurnal and nocturnal.

Table II presents the incidence of bruxism by sex, indicating that no differences existed between the sexes in the overall incidence of bruxism. However, men tended to be overrepresented among exclusively diurnal bruxists ( $z = 2.48$ ,  $p < .01$ ), while women reported significantly more exclusively nocturnal patterns ( $z = 5.07$ ,  $p < .0001$ ).

Table III presents data on the incidence of bruxism and its relationship to stress. In addition to the stressors nervousness, anger, and frustration, a fourth variable, "any stress," was computed by including subjects who responded to *any* of the three stressors. Significantly more bruxists reported a relationship between any stress and clenching or grinding than did the nonbruxist sample ( $\chi^2(1) = 128.33$ ,  $p < .001$ ). Compared with normal subjects, a significantly higher number of exclusively diurnal and both nocturnal and diurnal bruxists reported a relationship between stress and clenching or grinding than did the exclusively nocturnal bruxists ( $\chi^2(1) = 142.75$ ,  $p < .001$ ,  $\chi^2(1) = 75.46$ ,  $p < .001$ ,  $\chi^2(1) = 0.03$ , respectively). No significant differences were present between bruxists with regard to the three individual stressors.

Table IV presents data on the familial incidence

of bruxism. Overall, bruxists showed a higher incidence of bruxism among family members than did normal subjects ( $\chi^2(1) = 21.35$ ,  $p < .001$ ). However, no significant relationships were present between familial incidence and the three categories of bruxism.

Since the effects of bruxism would be expected to diminish when the behavior ceased, only those individuals who currently reported diurnal or nocturnal clenching or grinding behavior are included in the inferential tests of the effects of bruxism. Bruxists reported more tired jaws in the morning than did nonbruxists (9% versus 0.8%,  $\chi^2(1) = 42.65$ ,  $p < .001$ ), more sensitive teeth than nonbruxists (11.7% versus 1.5%,  $\chi^2(1) = 47.10$ ,  $p < .001$ ), and more tired jaws in the evening than nonbruxists (11.7% versus 3.7%,  $\chi^2(1) = 21.66$ ,  $p < .001$ ).

An increased frequency of headaches also characterized bruxists (17.5% as opposed to 9.7%,  $\chi^2(1) = 10.03$ ,  $p < .01$ ). The relative rates of earaches were not different between bruxists and nonbruxists (3.6% to 2.1%).

Self-observation was the major means by which exclusively diurnal and both diurnal and nocturnal groups learned of their bruxism (84.6% and 75.8%), while reports from relatives were the major means by which exclusively nocturnal bruxists learned of their bruxism (67.1%).

## DISCUSSION

Incidence figures suggest that the overall rates of bruxism in the general population are relatively high and that diurnal habits occur significantly more often than nocturnal bruxism or mixed diurnal and nocturnal bruxism. Current bruxists comprised 21.2% of the sample, a figure similar to the 21% rate reported for a similarly sized sample of middle-aged men.<sup>3</sup> Exclusively nocturnal bruxists and both diurnal and nocturnal bruxists comprised 3.3% and 4.5% of the sample, respectively. These figures compare to the 5.1% rate reported for a large sample of college students.<sup>2</sup> No comparable figures have been reported for nonpatient diurnal bruxist samples.

The significant sex differences found for exclusively diurnal and exclusively nocturnal categories are similar to findings reported by Reding et al.<sup>2</sup> that a greater proportion of women (6.2%) than men (4.6%) were present in a nocturnal bruxist group.

The responsivity of the exclusively diurnal and both diurnal and nocturnal groups to stress is consis-

tent with Olkinuora's hypothesis<sup>9</sup> that diurnal and nocturnal bruxism have different etiologic bases. Olkinuora hypothesized that occlusal abnormalities were more important in nocturnal bruxism, while stress was a key factor in diurnal bruxism. Some experimental evidence regarding these hypotheses has been reported. Rao and Glaros,<sup>20</sup> in an experimental study of diurnal bruxists and normal subjects, demonstrated that diurnal bruxists were more responsive to stress than normal subjects, and that no significant differences in occlusal abnormalities were present in the two groups.

If Olkinuora's hypotheses regarding occlusal abnormalities and nocturnal bruxism are correct, the high proportion of women in the exclusively nocturnal group would imply that women have more occlusal abnormalities than males. This hypothesis has received little empirical support. Perhaps the sex differences noted here may be attributed to a greater tendency by women to acknowledge physical dysfunction and a greater tendency by men to respond to perceived threat or aggression.

The finding that over one-fourth of the nonbruxist group reported clenching or grinding in response to stress suggests that this behavior is a relatively common response to particular stressors (especially anger)<sup>21</sup> in normal subjects. While a single stressor initially results in clenching or grinding, stimulus generalization occurs in bruxists so that other stimuli also elicit this response (for example, the negative findings for *type* of stressor in bruxist groups).

Data on the familial incidence of bruxism do not support Olkinuora's hypotheses. Although the rates reported for siblings are higher than those reported for parents, genetic and environmental influences are confounded. Given the difficulties involved in separating environmental from genetic components, the hypothesis of greater genetic involvement in nocturnal bruxists must remain speculative.

Data on the effects of bruxism confirm previous reports on the discomforts suffered by these patients.<sup>8, 13</sup> Additionally, these data and the data on the means by which individuals learn of their clenching or grinding behaviors are consistent with Rieder's conclusion<sup>3</sup> that observations made by patients or family members may be useful tools in the diagnosis of bruxism.

## CONCLUSIONS

This study reported on the results of a large-scale survey of college students. Bruxists identified by the survey were subdivided into exclusively diurnal,

exclusively nocturnal, or both diurnal and nocturnal groups. Results indicated that (1) diurnal bruxism occurs more often than nocturnal bruxism, (2) men report more diurnal bruxism, while women report more nocturnal bruxism, (3) diurnal bruxists are more responsive to stress than nocturnal bruxists, (4) bruxists report significant side-effects of the disorder, (5) familial incidence is not different among the subcategories of bruxists, and (6) diurnal bruxists became aware of their behavior through self-observation, while nocturnal bruxists were informed of their behavior by relatives and friends.

These findings may be useful in resolving theoretic controversies concerning bruxism. For example, several authors<sup>11, 16, 17, 19</sup> have reported a correlation between a variety of stressors and bruxism. Others<sup>22, 23</sup> have not found this correlation. The results from the present study suggest that different proportions of diurnal and nocturnal bruxists in the samples may account for these findings.

The results may also have treatment implications. If diurnal bruxists are responsive to stress, a psychologic approach to stress management might be an effective treatment for diurnal bruxism.<sup>8, 20</sup> Alternatively, if future research suggests that nocturnal bruxists have, as Olkinuora suggested, more occlusal abnormalities than diurnal bruxists, occlusal equilibration might be the most effective treatment for nocturnal bruxism.

Thus, the results suggest that the differentiation of bruxists into nocturnal and diurnal groups has considerable theoretic and practical usefulness.

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*Reprint requests to:*  
 DR. ALAN G. GLAROS  
 DEPARTMENT OF PSYCHOLOGY  
 WAYNE STATE UNIVERSITY  
 DETROIT, MI 48202

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