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**ORIGINAL**

# Epworth Sleepiness Scale and Sleep Disorders in young people with Sleep Bruxism: cross-sectional study

## Escala de somnolencia Epworth y trastornos del sueño en jóvenes con bruxismo del sueño: estudio transversal

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## ABSTRACT

The study aimed to describe the results of the Epworth Sleepiness Scale and sleep disturbances in young adults aged 21 to 25 diagnosed with sleep bruxism through polysomnography. A descriptive observational study was conducted with 20 participants to analyze sleep disturbances related to habits and behavioral disorders, as well as specific sleep disorders and movement disorders during sleep. Additionally, the Epworth Sleepiness Scale was applied, and physical conditions such as body mass index, neck circumference, and airway obstruction degree were evaluated. The statistical analysis was descriptive, using measures of central tendency, absolute, and relative frequencies. The results showed a high prevalence of sleep disorders in participants with Sleep Bruxism. The main disturbances observed were excessive daytime sleepiness (60 %), insufficient sleep (40 %), variability in sleep schedules (50 %), insomnia (30 %), and somniloquy (75 %). The recorded averages were: Epworth Sleepiness Index of 11, neck circumference of 33,15 cm, Body mass index of 23,58, and airway obstruction degree of 20 %, none of which reached risk levels. In conclusion, the results reflect a high prevalence of sleep disturbances, mainly excessive daytime sleepiness, insufficient sleep, possible signs of depressive disorder, and somniloquy in young adults with sleep bruxism.

**Keywords:** Sleep Bruxism; Sleep Disorders, Intrinsic; Sleep Initiation and Maintenance Disorders; Sleep Arousal Disorder; Nocturnal Myoclonus Syndrome.

## RESUMEN

El estudio tuvo como objetivo describir los resultados de la escala de somnolencia de Epworth y las alteraciones del sueño en jóvenes de 21 a 25 años diagnosticados con bruxismo del sueño mediante polisomnografía. Se realizó un estudio observacional descriptivo con 20 participantes para analizar las alteraciones del sueño relacionadas con hábitos y desórdenes del comportamiento, así como trastornos específicos y del movimiento

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durante el sueño. Además, se aplicó el índice de somnolencia de Epworth y se evaluaron condiciones físicas como el índice de masa corporal, la circunferencia del cuello y el grado de obstrucción de la vía aérea. El análisis estadístico fue de tipo descriptivo, utilizando medidas de tendencia central y frecuencias absolutas y relativas. Los resultados mostraron una alta prevalencia de trastornos del sueño en los participantes con bruxismo del sueño. Entre las principales alteraciones se encontraron: somnolencia diurna excesiva (60 %), sueño insuficiente (40 %), variabilidad en el horario de sueño (50 %), insomnio (30 %) y somniloquia (75 %). Los promedios registrados fueron: índice Epworth de 11, circunferencia del cuello de 33,15 cm, IMC de 23,58 y grado de obstrucción de la vía aérea del 20 %. Ninguno de estos indicadores alcanzó valores considerados de riesgo. En conclusión, los resultados reflejan una alta prevalencia de alteraciones del sueño, principalmente somnolencia diurna excesiva, sueño insuficiente, posibles signos de trastorno depresivo y somniloquia en jóvenes con bruxismo del sueño.

**Palabras clave:** Bruxismo del Sueño; Trastornos Del Sueño Intrínsecos; Trastornos de Inicio y Mantenimiento del Sueño; Trastorno del Despertar del Sueño; Síndrome de Mioclono Nocturno.

## INTRODUCTION

Sleep is a fundamental activity for physical and emotional health. Inadequate sleep is recognized as a potential risk factor for developing obesity, diabetes, heart disease, and depression. Moreover, sleep disorders represent a significant burden on health systems.[1] The sleep disorders manual of the American Academy of Sleep Medicine, developed in cooperation with international sleep societies, is the key reference for diagnosing these conditions.

This classification identifies seven main categories of sleep disorders: insomnia disorders, sleep-related breathing disorders, central hypersomnolence disorders, circadian rhythm sleep-wake disorders, sleep-related movement disorders, parasomnias, and other unspecified sleep disorders. These conditions are addressed through the „Sleep Clinical History," which allows for a systematic evaluation of patients.

One of the most common consequences of sleep disorders is fatigue and excessive daytime sleepiness. Affected individuals often struggle with daily activities that require memory, learning, logical reasoning, and problem-solving.[2] Stress has also been associated with sleep disorders, and experimental studies have shown that stress can disrupt sleep.[3,4] This raises the question of whether stress is the predominant factor affecting sleep quality, regardless of the presence or absence of Sleep Bruxism.

Sleep bruxism has also been linked to being overweight, according to the findings of Maluly et al.,[5] suggesting that it may be associated with factors other than chronic stress or poor sleep quality. However, current literature is controversial regarding the relationship between Sleep Bruxism and general anxiety symptoms in adults. Although there is no definitive consensus, some studies suggest a possible association between Sleep Bruxism and specific symptoms such as stress sensitivity, anticipatory anxiety, and panic symptoms.[6]

Sleep Bruxism is defined as a masticatory muscle activity during sleep, which can be rhythmic (phasic) or non-rhythmic (tonic). In healthy, asymptomatic individuals, this activity is not considered a movement or sleep disorder. [7] The classic signs of Sleep Bruxism include tooth wear, pain or hypertrophy of the masticatory muscles, morning headaches (especially in the frontal and temporal regions), cheek and tongue indentations, and jaw locking. [7,8] The etiology of Sleep Bruxism is considered multifactorial and has been linked to sleep disturbances, genetic polymorphisms, exogenous factors, medication use, substance abuse, and psychosocial components.[9,10]

Polysomnography is considered the "gold standard" for diagnosing sleep bruxism and identifying comorbidities such as sleep apnea-hypopnea, restless legs syndrome, and parasomnias. This examination records physiological events throughout an entire night of sleep using electrodes and sensors in a controlled environment.[11] Polysomnography records key biosignals that help identify concurrent sleep disorders and recognize specific episodes of bruxism during sleep.

This investigative study aimed to describe sleep disturbances in individuals diagnosed with sleep bruxism through polysomnography.

## METHOD

### Design

This cross-sectional descriptive study was conducted following the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines to ensure rigor and transparency in observational research. [12] The study protocol was approved by the Bioethics Committee of

University of Antioquia (Colombia) and adhered to the regulations of Resolution N 8430 governing health research, in accordance with the Helsinki Declaration.[13]

**Context**

This study was conducted in the sleep laboratory at the University of Antioquia (Colombia), using Polysomnography records from young adults diagnosed with Sleep Bruxism. The study population included 20 participants aged 23 to 25 years, who met the inclusion criteria and were evaluated through a standardized sleep clinical history. Polysomnography data were analyzed to assess various sleep-related disorders, including insomnia, parasomnias, and movement disorders during sleep, along with physical conditions such as Body mass index, neck circumference, and airway obstruction based on tonsil size. The sleep history also evaluated excessive daytime sleepiness using the ESE and explored the participants' sleep habits and the likelihood of depressive or anxiety disorders. The Polysomnography evaluations were conducted by an experienced sleep physiologist who analyzed physiological and neurophysiological data, focusing on sleep architecture, respiratory patterns, muscle activity, and micro-arousals.

**Participants**

The study involved 20 young adults aged between 23 and 25 years, diagnosed with Sleep Bruxism through Polysomnography at the sleep laboratory of the University of Antioquia (Colombia). Participants were selected following specific eligibility criteria. Inclusion criteria consisted of young adults with a confirmed diagnosis of Sleep Bruxism based on Polysomnography and the absence of significant comorbidities that could affect sleep patterns. Exclusion criteria included undergoing current dental treatment, having more than four conservative prosthodontic restorations on crowns, the presence of more than two non-functional edentulous zones (excluding third molars), wearing removable dental prostheses or extensive prosthetic restorations, and having severe malocclusions that could compromise the assessment of bruxism. These criteria were established to reduce variability and eliminate confounding factors in the evaluation of sleep-related disturbances.

**Sleep History**

The sleep history was assessed by evaluating various factors, including the individual's identification data, excessive sleepiness measured using the Epworth Sleepiness Scale, sleep habits in terms of adequacy and variability, and the likelihood of major depressive or anxiety disorders. In addition, the history explored specific sleep disorders, such as insomnia, parasomnias, and sleep movement disorders.[14] The history also included physical conditions related to the participant, such as body mass index, neck circumference, and the degree of airway obstruction based on tonsil size.[15,16] Each condition was assigned a score to determine its presence in the participant.

**Sleep Bruxism**

Sleep bruxism was assessed by evaluating the frequency of bruxism events during Polysomnography. The diagnosis required that a patient exhibit more than 25 episodes of bruxism activity per hour. Bruxism activity during Polysomnography refers to episodes of involuntary teeth grinding or clenching, identified through measurements of jaw muscle activity. This criterion is crucial for accurately classifying patients in sleep bruxism studies, allowing an objective evaluation of the presence and severity of the disorder.[17,18] The analysis of Sleep Bruxism events involved the use of Cadwell Easy III polysomnography software.[19]

**Bias**

Several potential biases were considered in this study. Selection bias could have influenced the results, as the sample was drawn from a specific group of young adults diagnosed with sleep bruxism, which may not be representative of the broader population with the disorder. Additionally, the classification of excessive sleepiness based on the Epworth Sleepiness Scale may not capture all individuals with bruxism, particularly those with milder or subclinical symptoms, limiting the generalizability of the findings. Information bias is another potential risk, as the data were self-reported by participants through the Epworth Sleepiness Scale, which is subject to individual perceptions of sleepiness and may not accurately reflect the actual severity of bruxism. Finally, confounding bias could have been introduced due to the presence of comorbidities or other sleep disorders in the participants, which were not fully controlled for in the analysis and may have influenced the observed results.

**Sample Size**

The sample size calculation was performed using G*Power software. A total of 20 participants were determined to be adequate for this observational study, considering a moderate effect size (d = 0,5) and a significance level of 0,05. The analysis indicated a statistical power of 57 %. Although this power is lower than typically desired for definitive conclusions, the study offers valuable preliminary insights into the sleep disturbances associated with sleep bruxism. The limited power is mainly due to the small sample size, a common limitation in early-stage research or when studying rare conditions. Nevertheless, this study's findings provide a foundation for

future research with larger sample sizes to enhance statistical power and further explore the relationship between sleep bruxism and sleep disturbances. Additionally, the homogeneity of the sample, along with the careful control of potential confounding variables, helped maintain the internal validity of the study, reducing variability and increasing the reliability of the results.[20,21]

**Statistical Analysis**

Data were analyzed using IBM SPSS Statistics version 27.0 for Windows. The normality of the data distribution was assessed using the Shapiro-Wilk test, while homogeneity of variances was tested with Levene's test. Descriptive statistics were calculated, including measures of central tendency (mean) and dispersion (standard deviation), as well as relative frequency, absolute frequency, and 95 % confidence intervals, to provide a comprehensive understanding of the data distribution and variability.

## RESULTS

Table 1 presents the descriptive statistics of sleep-related variables in participants diagnosed with sleep bruxism (n = 20). The table includes the mean (X) and standard deviation (SD) for each variable, as well as the 95 % confidence intervals (95 % IC). The variables measured include the Epworth Scale for daytime sleepiness, the differences in sleep hours between work and non-work days, Body mass index, neck circumference, and the degree of airway obstruction. The values provide an overview of the central tendency and variability for these key factors, offering insight into the sleep-related characteristics of individuals with sleep bruxism.

**Table 1.** Descriptive statistics of Sleep-Related variables in participants with Sleep Bruxism (n = 20)

| Variables | X ± SD | 95 % IC |
|---|---|---|
| Epworth Scale | 11,0 ± 4,09 | 9,09 - 12,91 |
| Differences between work and non-work sleep hours | 1,87 ± 0,80 | 1,49 - 2,24 |
| Body mass index (kg /m)$^2$ | 23,58 ± 4,96 | 21,26 - 25,90 |
| Neck circumference measurement | 33,15 ± 3,25 | 31,63 - 34,67 |
| Degree of airway obstruction in % | 20 ± 15,39 | 12 - 27 |

X: mean, SD: standard deviation, 95 % IC: 95 % confidence intervals.

The average age of the participants with sleep bruxism was 23,2 years (95 % CI 21,48–24,91), with 5 males (25 %) and 15 females (75 %). Regarding sleep disorders, 60 % of the participants reported excessive daytime sleepiness, 40 % experienced insufficient sleep, and 45 % had a likelihood of generalized anxiety disorder. Somniloquy was present in 75 % of participants, while 50 % showed variability in their sleep schedule. As for physical conditions, 30 % of the subjects had a body mass index greater than 28, indicating a potential risk. The mean values for these variables did not indicate any risk in the participants with sleep bruxism (table 2).

**Table 2.** Prevalence of Sleep Disorder variables according to Sleep Bruxism (n = 20)

| Variables related to sleep habits | No. | % | IC 95 % |
|---|---|---|---|
| Excessive daytime sleepiness | 12 | 60 | 38,50 to 81,40 |
| Insufficient sleep | 8 | 40 | 18,52 to 61,47 |
| Day-to-day variability in sleep schedule | 10 | 50 | 28,08 to 71,91 |
| Variables related to the possibility of psychiatric or behavioral disorders | | | |
| Probability of major depressive episode | 6 | 30 | 9,90 to 50,00 |
| Probability of generalized anxiety disorder | 9 | 45 | 23,19 to 66,80 |
| Variables related to specific sleep disorders | | | |
| Insomnia | 6 | 30 | 9,90 to 50,00 |
| Nightmares | 4 | 20 | 2,40 to 37,50 |
| Sleepwalking | 1 | 5 | 4,50 to 14,55 |
| Night terrors | 2 | 10 | 3,10 to 23,10 |
| Somniloquy | 15 | 75 | 56,02 to 93,97 |
| Nocturnal cramps | 5 | 25 | 6,02 to 43,97 |
| Sleep enuresis | 2 | 10 | -3,14 to 23,14 |
| Variables related to movement disorders during sleep | | | |
| Restless legs syndrome | 1 | 5 | 4,50 to 14,50 |

| | | | |
|---|---|---|---|
| Believes they have sleep bruxism (self-reported Sleep Bruxism) | 10 | 50 | 23,19 to 66,80 |
| Loud and uncomfortable snoring | 9 | 45 | 23,19 to 66,80 |
| Variables related to physical body conditions | | | |
| Risk due to body mass index > 28 | 6 | 30 | 9,91 to 50,08 |
| Risk due to tonsil hypertrophy | 1 | 5 | 4,55 to 14,55 |
| Risk due to cranial structure | 2 | 10 | 3,40 to 23,40 |
| Risk due to Angle Class II or III occlusal relationship | 1 | 5 | 4,70 to 14,70 |

n: number of subjects, %: Percentage frequency, 95 %IC: 95 % confidence intervals

## DISCUSSION

In this study, 50 % of the participants with Sleep Bruxism showed a variation in their sleep schedule of more than two hours daily, and 60 % reported excessive daytime sleepiness. Câmara-Souza et al.[22] suggest that individuals with Sleep Bruxism may not achieve restorative sleep at night, which prevents neural functions from being restored and true relaxation from occurring, leading to daytime sleepiness. Furthermore, 45 % of the participants in this study had a probability of generalized anxiety disorder. Literature has suggested that anxiety can affect sleep quality, argue that anxiety-related chemical mediators activate the adrenal-hypothalamic axis, which controls the release of catecholamines, altering both wakefulness and sleep initiation and maintenance, thereby affecting their quality. In this study, anxiety was assessed by identifying symptoms such as nervousness, worry, and tension experienced by the participants. Anxiety symptoms were found to be more prevalent among individuals with Sleep Bruxism,[23] with some studies linking these symptoms to oxidative imbalance, which could contribute to Sleep Bruxism in a vicious cycle. The contradictory findings in the literature regarding the relationship between Sleep Bruxism and anxiety may be attributed to the multifactorial nature of Sleep Bruxism, differences in the methods used to study psychological disturbances, the use of various biomarkers to identify anxiety, and confusion about whether these symptoms are causes or triggers of the disorder.[24]

In the present study, only 50 % of the participants diagnosed with Sleep Bruxism self-reported this condition, while the other 50 % did not, even though they were identified with Sleep Bruxism through Polysomnography. It is possible that self-reporting of Sleep Bruxism is unreliable. The self-report questions included whether participants were aware of teeth grinding or clenching, or if they experienced jaw pain or discomfort upon waking. Self-diagnosis may be inaccurate due to a lack of awareness of current behaviors (e.g., noise emissions in individuals who sleep alone).[7] This is consistent with findings indicating a high prevalence of patients who are unaware that they grind their teeth at night.[25] This finding is important for dentists to consider in their daily practice. Additionally, 30 % of the participants in this study with Sleep Bruxism had a risk of obesity, as indicated by a Body mass index.[26] The evidence on the association between Body mass index and bruxism is limited; however, higher Body mass index is associated with sympathetic activity and increased plasma catecholamine levels, similar to hypertension.[27] Moreover, both obesity and bruxism have been linked to decreased salivary flow.[28]

Furthermore, 45 % of the participants with Sleep Bruxism reported uncomfortable and loud snoring. In the study by Palinkas et al.[29] no significant difference in snoring frequency was found between the Sleep Bruxism group and a control group, although they observed a trend toward more frequent snoring in the Sleep Bruxism group. Smardz et al.[30] found higher prevalence of frequent snoring episodes in younger individuals with Sleep Bruxism compared to adults. Some authors have suggested that Sleep Bruxism may be associated with psychological changes, stress, depression, anxiety, central nervous system alterations, and obstructive sleep apnea;[31] however, the relationship between these behavioral activities and the number of habitual snoring episodes remains undetermined.[29]

This study had limitations, as the participants with Sleep Bruxism were drawn from a non-probabilistic sample, and the study design was descriptive, with no intention to establish associations between variables. However, the participants were homogeneous in age and were diagnosed with Sleep Bruxism via polysomnography.

## CONCLUSIONS

In conclusion, this study revealed a high prevalence of sleep disturbances among individuals with Sleep Bruxism, including excessive daytime sleepiness, insufficient sleep, the possibility of depressive disorders, and somniloquia. The findings highlight the need for further research to better understand the complex relationship between Sleep Bruxism and other sleep-related issues. Specifically, studies exploring the underlying mechanisms of these associations, such as the role of anxiety or other psychiatric comorbidities, would be valuable. The contradictory results found in the literature regarding the interaction between Sleep Bruxism and anxiety underscore the multifactorial nature of Sleep Bruxism. Furthermore, additional research with larger and more diverse samples is needed to improve the generalizability of the results and clarify the influence of various risk factors on Sleep Bruxism. Longitudinal studies could provide insights into the progression of Sleep Bruxism

and its impact on sleep quality and daytime functioning. Additionally, evaluating the effectiveness of different therapeutic interventions for Sleep Bruxism, particularly those addressing associated conditions like excessive daytime sleepiness and anxiety, would contribute to the development of more comprehensive treatment strategies. Overall, these future investigations would provide a deeper understanding of Sleep Bruxism, offering clearer guidance for clinical practices and improved management of the disorder.

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## CONFLICT OF INTERESTS

The authors declare that there are no conflicts of interest.

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