

Can sleeping habits be associated with sleep bruxism, temporomandibular disorders and dental caries among children?

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Abstract

Background. Sleeping problems are common in the pediatric population. Their potential relationship with oral manifestations is in the scope of researchers' interest.

Objectives. The aim of the present study was to evaluate the possible associations between sleeping habits and sleep bruxism, temporomandibular disorders (TMD) and dental caries among children by using Children's Sleep Habits Questionnaire (CSHQ).

Material and methods. A cross-sectional study was carried out at the Faculty of Dentistry of Istanbul Aydin University, Turkey, with a representative sample of 100 children aged 6–13 years. The CSHQ was completed by their parents. In addition, an intraoral examination was carried out in a clinical setting and sleep bruxism was recorded. The temporomandibular joints (TMJ) were examined and TMD were rated according to the Helkimo anamnestic and clinical dysfunction index. Data was analyzed with Fisher's exact test and the χ^2 test.

Results. Among sleeping habits, bedtime resistance was found to be significantly associated with sleep bruxism and TMD symptoms in children. Sleep behavior problems were also found to be related to TMD. Untreated dental caries was significantly associated with sleep fragmentation.

Conclusions. Sleep bruxism, TMD and untreated dental caries might have a negative impact on children's sleeping habits and characteristics. Pediatricians and pedodontists should collaborate to identify the causes and clinical features of sleeping habits and disorders in order to avoid adverse effects on the child's stomatognathic system.

Keywords: dental caries, temporomandibular disorders, sleep bruxism, sleeping habits, Children's Sleep Habits Questionnaire (CSHQ)

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Introduction

It is well-known that sleep has an essential effect on the growth and development of a child. Nevertheless, sleep disorders are common in children from infancy through adolescence.^{1–3} Parents and pediatricians should prudently detect sleeping habits and patterns to avoid possible adverse effects on the child's general health.⁴ Sleeping habits may vary from bedtime resistance, through the delayed and fragmented sleep, to inability to sleep alone. These are all associated with sociocultural, physical, emotional, and neurological development.^{5,6}

To identify the child's sleeping habits, many techniques, instruments and questionnaires are available. The Children's Sleep Habits Questionnaire (CSHQ) is a valid and reliable parent-proxy instrument for the investigation of the child's sleep-related difficulties.⁷

According to the International Classification of Sleep Disorders (ICSD), sleeping disorders can be categorized as insomnia, sleep-related breathing disorders, central disorders of hypersomnolence, circadian rhythm sleep–wake disorders, sleep-related movement disorders, and parasomnia.⁸ According to the new consensus on the definition of bruxism, it is a repetitive masticatory muscle activity characterized by the clenching or grinding of the teeth and/or the bracing or thrusting of the mandible, and it can be specified as either sleep bruxism or awake bruxism.⁹

Among the abovementioned, one of the sleep-related movement disorders – sleep bruxism – is frequently reported by parents or partners. A recent systematic review and meta-analysis showed that the prevalence of sleep bruxism in children was 31.16%.¹⁰ The risk factors related to bruxism include male gender, genetic predisposition, anxiety, poor sleep quality, object biting, exposure to second-hand smoke, headaches, peer problems, emotional symptoms, and mental health problems.^{11–13}

Exacerbated sleep bruxism may lead to an imbalance in the stomatognathic system. This may cause heterogeneous musculoskeletal disorders, involving the temporomandibular joints (TMJ) and related structures in the long term.^{14–17} Furthermore, the resulting discomfort leads to dysfunction.^{18–20} Yet, it is still questionable whether sleep bruxism is related to the clinical findings of temporomandibular disorders (TMD).^{21,22}

Notably, individuals with sleep bruxism are reported to present with the fragmented sleep, which adversely affects the quality of sleep and the quality of life in general.^{23,24} Hence, the early diagnosis of sleep bruxism and TMD as well as follow-up reports are crucial.^{25–27}

Another factor affecting sleeping patterns is dental caries, which can also lead to awakening from sleep at night. A cohort study revealed that late bedtime was associated with the incidence of dental caries.²⁸ Like in

a chain reaction, poor sleep quality impacts the level of attention and motor skills, which might increase the incidence of dental trauma.^{29,30}

Considering that sleep problems are common in the pediatric population, their potential relationship with oral manifestations is of interest to many researchers.¹⁴

Thus, the present study is innovative in searching for the possible associations between sleeping habits and sleep bruxism, TMD and dental caries while underlining the importance of collaboration between pediatricians and pediatric dentists.

The present study aimed to evaluate the possible associations between sleeping habits and sleep bruxism, TMD and dental caries among children aged 6–13 years by using CSHQ.

Material and methods

The study protocol was approved by the Human Research Ethics Committee of Istanbul Aydin University, Turkey (2020/169). Furthermore, the study was fully compliant with the World Medical Association Declaration of Helsinki.

This cross-sectional study involved 100 children who were referred to the Department of Pediatric Dentistry at the Faculty of Dentistry of Istanbul Aydin University for routine control or dental treatment during the period from March 2, 2020, to May 29, 2020. All cooperative children aged 6–13 years were included. The exclusion criteria were as follows: systemic diseases; fixed/removable intraoral/extraoral appliances; and previously diagnosed sleep disorders. Finally, informed written consent was obtained from the children's parents.

The data on sleeping habits was collected through parent-proxy reports with regard to CSHQ, which contains 33 questions. This questionnaire is segmented into 4 main topics: bedtime resistance; sleep behavior problems; sleep fragmentation; and daytime sleepiness. Each item has 3 response options regarding how often these conditions occurred the previous week. Frequencies are coded as: 'usually' if the specified behavior occurred more than 4 times per week; 'sometimes' for 2–4 times per week; and 'rarely' for 0–1 time per week. The presence of sleep bruxism was reported based on the answers to CSHQ.

One experienced dentist conducted intraoral examinations in a clinical setting to avoid inter-examiner bias. Carious lesions were recorded using the World Health Organization (WHO) criteria.³¹ The examiner recorded a surface as decayed only if it presented with a detectably softened floor, undermined enamel or a softened wall. According to this criterion, all stages that precede cavitation and other conditions, like the early stages of a carious lesion, were considered sound.

The TMJ examination was conducted by an experienced prosthodontist, and TMD were rated according to the Helkimo anamnestic and clinical dysfunction index.³² The lack of symptoms was encoded as 'grade 0', mild symptoms (the feeling of fatigue in the muscles, muscle stiffness and pain, and masticatory muscle disorders) were encoded as 'grade 1', and serious symptoms (not being able to open the mouth widely, jaw locking or dislocation, jaw pain, and limitation in mandibular movements, pain in the area of TMJ and/or masticatory muscles, and condyle–disc irregularities in TMJ) were encoded as 'grade 2'.

Statistical analysis

The statistical analysis was conducted using the IBM SPSS Statistics for Windows software, v. 25 (IBM Corp., Armonk, USA). Data was analyzed with Fisher's exact test and the χ^2 test. In cases where the expected frequencies were less than 20%, the evaluation was made by means of the Monte Carlo simulation method so that these frequencies could be included in the analysis. For the significance level of the tests, p -values <0.05 and <0.01 were set as thresholds.

Results

One hundred patients within the age range of 6–13 years (45 males and 55 females) met the inclusion criteria, and both the patients and their parents were included in this study. Mothers (76%) comprised the majority of these parents, followed by fathers (21%) and other relatives (3%).

Sixty percent of parents reported that their children had sleep bruxism. Gender was not found to be significantly associated with the presence of sleep bruxism. The prevalence of TMD symptoms was 9%. A significant association was found among children between sleep bruxism and TMD symptoms ($p = 0.015$).

Sleep bruxism and TMD both showed significant associations with bedtime resistance. The presence of sleep bruxism was significantly higher in children with bedtime difficulties ($p = 0.024$) (Table 1). A statistically significant association was observed among children between TMD symptoms and bedtime resistance ($p = 0.020$), and between TMD symptoms and sleep behavior problems ($p = 0.041$) (Table 2). The prevalence of untreated dental caries was 98%. The presence of caries was also found to be significantly associated with awakening from sleep at night and sleep fragmentation ($p = 0.001$) (Table 3).

Table 1. Association between sleeping habits and sleep bruxism

Sleeping habits		Sleep bruxism		Total	p -value
		presence	absence		
Bedtime resistance	yes	15 (44.1)	19 (55.9)	34 (100)	0.020*
	no	45 (68.2)	21 (31.8)	66 (100)	
Sleep behavior problems	yes	0 (0)	2 (100)	2 (100)	0.080
	no	60 (61.2)	38 (38.8)	98 (100)	
Waking up at night/sleep fragmentation	yes	2 (66.7)	1 (33.3)	3 (100)	0.811
	no	58 (59.8)	39 (40.2)	97 (100)	
Inability to wake up/daytime sleepiness	yes	6 (40.0)	9 (60.0)	15 (100)	0.086
	no	54 (63.5)	31 (36.5)	85 (100)	
Total		60 (60.0)	40 (40.0)	100 (100)	–

Data presented as number (percentage) (n (%)). * statistically significant ($p < 0.05$).

Table 2. Association between sleeping habits and temporomandibular disorders (TMD)

Sleeping habits		TMD		Total	p -value
		presence	absence		
Bedtime resistance	yes	0 (0)	34 (100)	34 (100)	0.024*
	no	9 (13.6)	57 (86.4)	66 (100)	
Sleep behavior problems	yes	1 (50.0)	1 (50.0)	2 (100)	0.041*
	no	8 (8.2)	90 (91.8)	98 (100)	
Waking up at night/sleep fragmentation	yes	0 (0)	3 (100)	3 (100)	0.580
	no	9 (9.3)	88 (90.7)	97 (100)	
Inability to wake up/daytime sleepiness	yes	1 (6.7)	14 (93.3)	15 (100)	0.732
	no	8 (9.4)	77 (90.6)	85 (100)	
Total		9 (9.0)	91 (91.0)	100 (100)	–

Data presented as n (%). * statistically significant ($p < 0.05$).

Table 3. Association between sleeping habits and dental caries

Sleeping habits		Dental caries		Total	p-value
		presence	absence		
Bedtime resistance	yes	33 (97.1)	1 (2.9)	34 (100)	0.629
	no	65 (98.5)	1 (1.5)	66 (100)	
Sleep behavior problems	yes	2 (100)	0 (0)	2 (100)	0.838
	no	96 (98.0)	2 (2.0)	98 (100)	
Waking up at night/sleep fragmentation	yes	2 (66.7)	1 (33.3)	3 (100)	0.001*
	no	96 (99.0)	1 (1.0)	97 (100)	
Inability to wake up/daytime sleepiness	yes	15 (100)	0 (0)	15 (100)	0.548
	no	83 (97.6)	2 (2.4)	85 (100)	
Total		98 (98.0)	2 (2.0)	100 (100)	–

Data presented as n (%). * statistically significant ($p < 0.05$).

Discussion

Today, children's sleeping habits are the focus of pediatricians and dentists. The possible associations between sleeping habits and sleep bruxism, TMD, malocclusion, and dental caries have been investigated recently, and they are still a significant area of researchers' interest.^{28–30}

In the present study, the Turkish version of CSHQ was used for data collection. The questionnaire was translated into Turkish, validated and reported to be a reliable instrument for assessing the sleeping habits of Turkish children.³³ Although there are various concerns that the parent's report may differ from the child's self-report, scales based on parents' reports are frequently used in both psychiatry and pediatric practice.³⁴ It is noteworthy that the American Academy of Sleep Medicine considers parents' reports reliable and sufficiently objective for use in epidemiological studies.⁸ The assessment of sleep bruxism is graded as: possible sleep/awake bruxism based on a self-report only; probable sleep/awake bruxism based on a self-report and clinical inspection; and definite sleep bruxism based on a self-report, clinical inspection and polysomnography.⁹ The role of the family in the diagnosis of pediatric sleep bruxism is considerable, as family members typically observe the characteristic sounds produced while grinding the teeth at night.⁴ A potential limitation of the present study is that the assessment of sleep bruxism was done based on the parents' reports only.

Sleep bruxism is hereditary. Muscle pain, snoring and mouth breathing are characteristic signals when detecting sleep bruxism in children. Sleep fragmentation, sleep agitation and nightmares have been reported to be possibly associated with sleep bruxism.^{35,36}

In the present study, the prevalence of sleep bruxism was found to be 60%. This value is much higher than that observed in a systematic review by Machado et al., who reported that the prevalence rates for sleep bruxism

varied from 5.9% to 49.6%.¹⁸ These variations can be attributed to different diagnostic criteria used.¹⁸ Therefore, evidence-based studies with standardized and validated diagnostic criteria are required for accurate assessment. Insana et al. reported that sleep bruxism affected more boys than girls.³⁷ In a study by Cheifetz et al., there was also a trend for males to be more likely to brux than females.²⁰ However, in the present study, no significant relationship was found between sleep bruxism and gender.

Our study revealed that sleep bruxism was associated with sleeping habits. The presence of sleep bruxism was significantly higher in children who had bedtime difficulties. Consistent with this finding, Öner et al. reported that the quality of sleep was associated with sleep bruxism in children, and that it decreased in the presence of sleep bruxism.³⁸

A total of 9% of children showed TMD symptoms in the present study. The prevalence of TMD in children and adolescents varies from 16% to 68%.³⁹ Mostly, the study populations' subjective TMD symptoms include jaw clicking, muscle tenderness, pain during opening, and limited opening.²⁰ There were statistically significant associations between TMD and negative sleeping habits and sleep bruxism in the present study. Children with bedtime resistance were more likely to have TMD. In contrast to our findings, Cheifetz et al. reported that TMD were not associated with sleep bruxism, which may be attributed to different diagnostic criteria used and different study designs.²⁰ However, the results of another recent research are consistent with ours; Lei et al. reported that TMD were significantly associated with disturbed sleep, adversely affecting sleep quality and the quality of life.²⁶

The prevalence of dental caries was very high in the present study, reflecting Turkey's unmet oral healthcare needs.⁴⁰ Subsequently, retardation in growth, school absenteeism and sleep fragmentation occur.³⁴ Dental caries was associated with sleep fragmentation in the present study, which is also in line with previous reports.^{41,42}

The associations between negative sleeping habits and oral manifestations suggest that sleeping habits should be investigated with other diagnostic methods to confirm these findings. In this manner, the data on sleeping habits obtained when collecting the patient's history before a dental appointment could better inform parents on how to prevent sleep bruxism and TMD. Consequently, the cooperation of pediatricians, pedodontists and psychiatrists is crucial in diagnosing, treating and preventing sleep-related oral health problems.

Conclusions

In the current study, children's sleeping habits were significantly associated with sleep bruxism, TMD and dental caries. Therefore, pediatricians and pediatric dentists should collaborate to identify the causes and clinical features of sleeping habits in order to prevent the possible oral and dental damage in children.

Ethics approval and consent to participate

The current study was carried out after obtaining approval from the Human Research Ethics Committee of Istanbul Aydin University, Turkey (2020/169). The participants' parents provided written informed consent prior to the investigation.

Data availability

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Consent for publication

Not applicable.

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