JBCR Journal of Biomedical & Clinical Research
Journal of Medical University of Pleven

Journal of Biomedical and Clinical Research 19: 87–97 (2026)
DOI: 10.3897/jbcr.e187203

Research Article

Duration and quality of sleep in patients with periodontal health and with periodontitis

Ivan Ivanov[1], Emilia Naseva[2], Angelika Velkova[3]

1 *Department of Periodontology, Faculty of Dental Medicine, Medical University of Sofia, Sofia, Bulgaria*
2 *Department of Social Medicine, Faculty of Public Health, Medical University of Sofia, Sofia, Bulgaria*
3 *Department of Health Management and Healthcare Economics, Faculty of Public Health, Medical University of Sofia, Sofia, Bulgaria*
Corresponding author: Ivan Ivanov (ivan.ivanov@fdm.mu-sofia.bg)

Summary

Abstract: Sleep is a key factor in human health. Lack of sleep is associated with many chronic diseases, including periodontal problems. Studies show that sleep disorders can worsen periodontal health and increase the risk of diseases such as gingivitis and periodontitis.

The study aims to investigate the importance of sleep for periodontal health among patients aged 18 and older in the Republic of Bulgaria.

Methods: In 2025, 504 patients were included in the current study. A detailed periodontal diagnosis and a survey with original questions and validated international instruments (Pittsburgh Sleep Quality Index) were performed.

Results: The duration of sleep per day in the studied individuals varies substantially, from 3 to 12 hours. Most often, the night sleep lasted between 6 and 7 hours, in 59.4% of respondents. The examined women slept longer, about a quarter of an hour longer ($p = 0.02$).

The study found approximately the same proportion of people without periodontitis (50.4%) and those with periodontitis at different clinical stages (49.6%). No significant differences were found in the average sleep duration in people without and those with periodontitis, as well as the time for falling asleep ($p > 0.05$). The entire score index for sleep quality (PSQI) showed significantly lower values among patients with periodontitis ($p = 0.049$), indicating better sleep quality. Furthermore, patients with periodontitis were more prevalent in the group of PSQI < 5 (46.6% compared to 35.6% in the other group, $p = 0.012$).

We further examined the differences in the questionnaire and found that patients with periodontitis had stayed awake less often. In addition, patients with periodontitis reported fewer sleep disturbance episodes.

Conclusion: Periodontal diseases are common conditions and have socially significant potential due to the possibility of loss of dentition and changes in facial aesthetics. At the same time, there is a bidirectional relationship between sleep problems and the systemic response to untreated periodontal disease. Future studies are needed to establish the effect of insufficient sleep on the development and progression of periodontitis.

Key words: Periodontal health, periodontitis, PSQI, sleep

OPEN ACCESS

Academic editor: Nadya Veleva
Received: 1 February 2026
Accepted: 24 February 2026
Published: 13 March 2026

Citation: Ivanov I, Naseva E, Velkova A (2026) Duration and quality of sleep in patients with periodontal health and with periodontitis. Journal of Biomedical and Clinical Research 19: 87–97. https://doi.org/10.3897/jbcr.e187203

Introduction

Periodontal diseases are the most widespread chronic inflammatory conditions, affecting more than 62% of the adult population worldwide, while severe forms of periodontitis involve nearly one quarter of individuals over the age of 65. (Trindade et al. 2023). These figures substantially exceed those reported in earlier epidemiological studies. (Marcenes et al. 2013). The last indicates a persistent trend toward increasing prevalence and growing social significance of the disease. In Europe and the United States, periodontal diseases impose a substantial economic burden due to the high cost of treatment and the long-term consequences, including complete edentulism (Botelho et al. 2022), resulting not only in increased healthcare system expenditures but also in significant financial and social burdens for the patient.

Sleep is a fundamental physiological regulator responsible for restorative processes and the maintenance of systemic homeostasis. Adequate sleep, both in duration and quality, provides benefits (Consensus Conference Panel et al. 2015), such as enhancement of cognitive functions (Marzola et al. 2023), the maintenance of cardiovascular health (Wang et al. 2022), the regulation of metabolism and the prevention of metabolic disorders (Spiegel et al. 2004), improves psycho-emotional balance (Walker 2009), as well as the modulation of the immune response (Besedovsky et al. 2012), through the regulation of pro-inflammatory cytokine levels (Wiener 2016).

Both insufficient sleep (less than 7 hours) (Consensus Conference Panel et al. 2015) and excessive sleep (more than 9 hours) (Gupta et al. 2022) are associated with an increased risk of cardiometabolic disorders and immune dysregulation. Since both periodontal diseases and sleep disturbances are linked to chronic systemic inflammatory activity, their interaction may exert a cumulative negative effect on overall health (Carra et al. 2023; Marruganti et al. 2023; Herrera et al. 2024) and have an impact on life quality (Lei and Hu 2024). The systemic inflammatory component in patients with shorter sleep duration may promote the development and progression of periodontitis. On this basis, a working hypothesis can be formulated suggesting a link between sleep duration and quality and the risk of developing periodontal disease, providing a theoretical foundation for novel approaches in the primary prevention of periodontitis.

We aimed to investigate the importance of sleep for periodontal health in patients aged 18 and over in the Republic of Bulgaria.

Methods

This population-based survey was conducted in 2025, including 504 consecutive patients. A detailed periodontal diagnosis and a survey with original questions and questions from validated international instruments were performed.

Questionnaires

A Pittsburgh Sleep Quality Index (PSQI) questionnaire was applied. The instrument was translated into Bulgarian, back-translated into English, and reviewed by a qualified translator. Subsequently, a pilot test was conducted in a small sample of patients (n = 80) using the Bulgarian version. The pilot study

facilitated the development of the final questionnaire, which served as the basis for the present investigation. The PSQI was used to assess subjective sleep quality over the preceding one-month period.

Statistical methods

The results are presented as numbers and proportions for categorical variables; median and interquartile range for numerical variables due to their non-Gaussian distribution. The distribution was assessed using the Kolmogorov-Smirnov test. Two groups were compared by the Mann-Whitney U test or Pearson Chi-square test, and p-values were presented. Results were considered significant if $p < 0.05$. The analysis was performed in IBM SPSS v. 29.

Results

The study found approximately the same proportion of people without periodontitis (50.4%) and those with periodontitis at different clinical stages (49.6%). (Table 1) The median age of the participants was 40 years, and those with periodontitis were significantly older ($p < 0.001$). The sex distribution in the two groups was similar ($p > 0.05$). A significantly higher proportion of those with periodontitis lived in smaller residential areas ($p = 0.010$). Periodontal patients described their income as significantly lower ($p < 0.001$) compared to patients without periodontal disease. There was no significant difference between the groups regarding the level of education ($p > 0.05$).

Table 1. Demographic characteristics of the studied population.

Variable	Category	Entire sample (n = 504)	Patients without periodontitis (n = 253)	Patients with periodontitis (n = 251)	p-value
Age	Median (IQR)	40 (25–53)	25 (22–35)	52 (45–59)	<0.001
	18–34 years	195 (38.7%)	184 (72.7%)	11 (4.4%)	<0.001
	35–49 years	146 (29.0%)	55 (21.7%)	91 (36.3%)	
	50–64 years	118 (23.4%)	8 (3.2%)	110 (43.8%)	
	65+ years	45 (8.9%)	6 (2.4%)	39 (15.5%)	
Sex	Male	228 (45.2%)	104 (41.1%)	124 (49.4%)	0.061
	Female	276 (54.8%)	149 (58.9%)	127 (50.6%)	
Place of living	Sofia	382 (75.8%)	205 (81.0%)	177 (70.5%)	0.010
	District town	77 (15.3%)	26 (10.3%)	51 (20.3%)	
	Small town	30 (6.0%)	19 (7.5%)	11 (4.4%)	
	Village	15 (3.0%)	3 (1.2%)	12 (4.8%)	
Financial status	High	71 (14.1%)	58 (22.9%)	13 (5.2%)	<0.001
	Medium	357 (70.8%)	177 (70.0%)	180 (71.7%)	
	Low	56 (11.1%)	11 (4.3%)	45 (17.9%)	
	Variable	20 (4.0%)	7 (2.8%)	13 (5.2%)	
Education	Master's degree	185 (36.7%)	97 (38.3%)	88 (35.1%)	0.055
	Bachelor's degree	66 (13.1%)	27 (10.7%)	39 (15.5%)	
	Professional Bachelor's degree	25 (5.0%)	9 (3.6%)	16 (6.4%)	
	Specialized secondary education	85 (16.9%)	17 (6.7%)	68 (27.1%)	
	Secondary education	132 (26.2%)	101 (39.9%)	31 (12.4%)	
	Primary education or lower	11 (2.2%)	2 (0.8%)	9 (3.6%)	

The duration of sleep per day in the studied individuals for the past month varied substantially, from 3 to 12 hours. Most often, the night sleep lasted between 6 and 7 hours in 59.4% of respondents.

No significant differences were found in the average sleep duration in people without and those with periodontitis, as well as the time for falling asleep ($p > 0.05$). (Table 2) The entire score index for sleep quality (PSQI) showed significantly lower values among patients with periodontitis ($p = 0.049$), indicating better sleep quality. Furthermore, patients with periodontitis were more prevalent in the group of PSQI < 5 (46.6% compared to 35.6% in the other group, $p = 0.012$). (Table 3)

Table 2. Comparison of sleep duration, time to fall asleep, and PSQI between patients with and without periodontitis.

Variable	Entire sample (n = 504)	Patients without periodontitis (n = 253)	Patients with periodontitis (n = 251)	p-value
Time for falling asleep (minutes)	10 (7–30)	10 (5–25)	10 (8–30)	0.604
Actual nocturnal sleep (hours)	7 (6–7.5)	7 (6–7)	7 (6–8)	0.416
PSQI Global Score	6 (5–8)	6 (5–8)	6 (4–8)	0.049

Values are reported as Median (IQR).

We further examined the differences in both groups and found that patients with periodontitis more often reported having trouble with their night sleep because they woke up ($p < 0.001$), had to go to the bathroom ($p < 0.001$), coughed or snored ($p < 0.001$), and had pain ($p < 0.001$). However, they reported less often having sleep disturbances because of nightmares ($p < 0.001$), as well as less often reported trouble with staying awake while driving, eating, or participating in other social activities ($p = 0.006$). In addition, patients with periodontitis less often reported trouble keeping up enough enthusiasm to get things done ($p < 0.001$).

Despite the significant differences in night sleep disturbances, patients with periodontitis had better sleep. We can speculate that this difference originated from many problems with sleep reported by the examined population. The latter were included in many components in the final PSQI, which explains why patients with more sleep problems have a better periodontal condition (Table 4).

Discussion

In the Bulgarian population, sleep problems (Taskov et al. 2024) and periodontitis have been examined separately. The current study assessed sleep quality and its correlation with clinical periodontal status. A study similar to ours, conducted in the U.S. population (Alhassani and Al-Zahrani 2020), found a higher prevalence of periodontitis associated with short sleep duration (<7 h/night). Patients reporting short sleep (<7 hours) exhibited a significantly higher risk of periodontitis development. Additionally, individuals sleeping more than 8 hours also showed a higher risk for periodontitis progression compared to the reference group (7–8 hours). Individuals with normal sleep duration were associated with a higher socioeconomic level. The authors of that study (Alhassani and Al-Zahrani 2020) concluded that insufficient sleep may be an independent correlate of periodontitis, emphasizing the need for prospective studies to assess causality.

Table 3. Comparison of sleep characteristics between patients with and without periodontitis (categorical data).

Components/Frequency Category	Entire sample (n = 504)	Patients without periodontitis (n = 253)	Patients with periodontitis (n = 251)	p-value
Component 3 – Sleep duration (hours)				**0.257**
Above 7	144 (28.6%)	62 (24.5%)	82 (32.7%)	
Between 6–7	172 (34.1%)	95 (37.5%)	77 (30.7%)	
Between 5–6	169 (33.5%)	88 (34.8%)	81 (32.3%)	
Below 5	19 (3.8%)	8 (3.2%)	11 (4.4%)	
Component 4 – Sleep Effectiveness				**0.625**
Above 85%	363 (72.0%)	180 (71.1%)	183 (72.9%)	
75%-84%	93 (18.5%)	48 (19.0%)	45 (17.9%)	
65%-74%	22 (4.4%)	9 (3.6%)	13 (5.2%)	
Less than 65%	26 (5.2%)	16 (6.3%)	10 (4.0%)	
Frequency of not being able to fall asleep within 30 minutes in the last month				**0.287**
Not during the past month	194 (38.5%)	98 (38.7%)	96 (38.2%)	
Less than once a week	153 (30.4%)	87 (34.4%)	66 (26.3%)	
Once/twice a week	96 (19.0%)	40 (15.8%)	56 (22.3%)	
More than 3× per week	61 (12.1%)	28 (11.1%)	33 (13.1%)	
Frequency of waking up in the middle of the night or early morning				**<0.001**
Not during the past month	160 (31.7%)	94 (37.2%)	66 (26.3%)	
Less than once a week	133 (26.4%)	76 (30.0%)	57 (22.7%)	
Once/twice a week	94 (18.7%)	35 (13.8%)	59 (23.5%)	
More than 3× per week	117 (23.2%)	48 (19.0%)	69 (27.5%)	
Frequency of getting up to use the bathroom				**<0.001**
Not during the past month	173 (34.3%)	119 (47.0%)	54 (21.5%)	
Less than once a week	121 (24.0%)	58 (22.9%)	63 (25.1%)	
Once/twice a week	107 (21.2%)	44 (17.4%)	63 (25.1%)	
More than 3× a week	103 (20.4%)	32 (12.6%)	71 (28.3%)	
Frequency of not being able to breathe comfortably				**0.625**
Not during the past month	420 (83.3%)	213 (84.2%)	207 (82.5%)	
Less than once a week	47 (9.3%)	22 (8.7%)	25 (10.0%)	
Once/twice a week	24 (4.8%)	11 (4.3%)	13 (5.2%)	
More than 3× a week	13 (2.6%)	7 (2.8%)	6 (2.4%)	
Frequency of cough or snoring loudly				**<0.001**
Not during the past month	377 (74.8%)	218 (86.2%)	159 (63.3%)	
Less than once a week	52 (10.3%)	19 (7.5%)	33 (13.1%)	
Once/twice a week	39 (7.7%)	8 (3.2%)	31 (12.4%)	
More than 3× per week	36 (7.1%)	8 (3.2%)	28 (11.2%)	
Frequency of feeling too cold				**0.719**
Not during the past month	368 (73.2%)	184 (73.0%)	184 (73.3%)	
Less than once a week	96 (19.1%)	56 (22.2%)	40 (15.9%)	
Once/twice a week	24 (4.8%)	9 (3.6%)	15 (6.0%)	
More than 3× a week	15 (3.0%)	3 (1.2%)	12 (4.8%)	
Frequency of feeling too hot				**0.391**
Not during the past month	267 (53.0%)	126 (49.8%)	141 (56.2%)	
Less than once a week	161 (31.9%)	92 (36.4%)	69 (27.5%)	
Once/twice a week	52 (10.3%)	26 (10.3%)	26 (10.4%)	
More than 3× a week	24 (4.8%)	9 (3.6%)	15 (6.0%)	

Components/Frequency Category	Entire sample (n = 504)	Patients without periodontitis (n = 253)	Patients with periodontitis (n = 251)	p-value
Frequency of having bad dreams				**<0.001**
Not during the past month	339 (67.3%)	140 (55.3%)	199 (79.3%)	
Less than once a week	120 (23.8%)	85 (33.6%)	35 (13.9%)	
Once/twice a week	35 (6.9%)	23 (9.1%)	12 (4.8%)	
More than 3× a week	10 (2.0%)	5 (2.0%)	5 (2.0%)	
Frequency of having pain				**<0.001**
Not during the past month	363 (72.0%)	197 (77.9%)	166 (66.1%)	
Less than once a week	80 (15.9%)	39 (15.4%)	41 (16.3%)	
Once/twice a week	36 (7.1%)	11 (4.3%)	25 (10.0%)	
More than 3× a week	25 (5.0%)	6 (2.4%)	19 (7.6%)	
Frequency of having problems with sleep due to other reasons				**0.397**
Not during the past month	375 (74.4%)	193 (76.3%)	182 (72.5%)	
Less than once a week	39 (7.7%)	16 (6.3%)	23 (9.2%)	
Once/twice a week	43 (8.5%)	21 (8.3%)	22 (8.8%)	
More than 3× a week	47 (9.3%)	23 (9.1%)	24 (9.6%)	
Component 1 – Subjective Sleep Quality during the past month				**0.166**
Very good	121 (24.0%)	53 (20.9%)	68 (27.1%)	
Fairly good	309 (61.3%)	161 (63.6%)	148 (59.0%)	
Fairly bad	60 (11.9%)	33 (13.0%)	27 (10.8%)	
Very bad	14 (2.8%)	6 (2.4%)	8 (3.2%)	
Component 6 – Use of sleep medication				**0.736**
Not during the past month	457 (90.7%)	230 (90.9%)	227 (90.4%)	
Less than once a week	25 (5.0%)	17 (6.7%)	8 (3.2%)	
Once or twice a week	9 (1.8%)	4 (1.6%)	5 (2.0%)	
More than 3× a week	13 (2.6%)	2 (0.8%)	11 (4.4%)	
Frequency of staying awake while driving, eating meals, or engaging in social activity				**0.006**
No problem	386 (76.6%)	180 (71.1%)	206 (82.1%)	
Once per week	73 (14.5%)	47 (18.6%)	26 (10.4%)	
1–2 times per week	32 (6.3%)	20 (7.9%)	12 (4.8%)	
3 or more times a week	13 (2.6%)	6 (2.4%)	7 (2.8%)	
How much of a problem has it been keep up enough enthusiasm to get things done				**<0.001**
No problem	179 (35.5%)	48 (19.0%)	131 (52.2%)	
A slight problem	186 (36.9%)	108 (42.7%)	78 (31.1%)	
Somewhat of a problem	122 (24.2%)	83 (32.8%)	39 (15.5%)	
A very big problem	17 (3.4%)	14 (5.5%)	3 (1.2%)	

A study in the Korean population (Han et al. 2022) highlighted both sleep timing and duration as relevant factors, establishing an association between periodontitis and sleep duration exceeding 9 hours, as well as daytime sleep. The Korean study authors reported that approximately seven hours of sleep per night was generally protective compared to very short sleep durations. Furthermore, combined models incorporating both bedtime and sleep duration in the Korean study revealed distinct risk patterns, including U-shaped associations in certain analyses. Interestingly, their finding of no statistically significant association between sleep duration or timing and severe periodontitis is consistent with our current investigation.

A systematic review (Zhou et al. 2024) presented results similar to our study and the aforementioned investigations, stating that neither short nor long sleep

Table 4. Comparison of PSQI components 2, 5, and 7 between patients with and without periodontitis.

Component/ Category	Entire sample (n = 504)	Patients without periodontitis (n = 253)	Patients with periodontitis (n = 251)	p-value
Component 7: Daytime dysfunction				**<0.001**
0	161 (31.9%)	43 (17.0%)	118 (47.0%)	
1–2	266 (52.8%)	158 (62.5%)	108 (43.0%)	
3–4	66 (13.1%)	45 (17.8%)	21 (8.4%)	
5–6	11 (2.2%)	7 (2.8%)	4 (1.6%)	
Component 2: Sleep latency				**0.471**
0	164 (32.5%)	86 (34.0%)	78 (31.1%)	
1–2	217 (43.1%)	108 (42.7%)	109 (43.4%)	
3–4	98 (19.4%)	46 (18.2%)	52 (20.7%)	
5–6	25 (5.0%)	13 (5.1%)	12 (4.8%)	
Component 5: Sleep disturbance				**0.001**
0	43 (8.5%)	28 (11.1%)	15 (6.0%)	
1–9	358 (71.0%)	186 (73.5%)	172 (68.5%)	
10–18	100 (19.8%)	38 (15.0%)	62 (24.7%)	
19-	3 (0.6%)	1 (0.4%)	2 (0.8%)	

duration was associated with periodontitis. Paradoxically, sleep duration below 5 hours per night was associated with a decreased risk of severe periodontal disease. A case-control study (Kamalian Mehrizi et al. 2025) involving participants not using sedatives or tranquilizers and diagnosed with various stages of Grade B periodontitis found no statistically significant correlation between sleep quality score and the severity of periodontal disease.

Several authors have examined the correlation between periodontitis stage and the global PSQI score. Karaaslan and Dikilitaş (2019) reported that patients with Stage IV periodontitis exhibited the highest PSQI scores, indicating poorer sleep quality. This finding offers a contrast to certain aspects of our results. Mehrizi et al. (2025) found a significant correlation between sleep quality and periodontitis. However, their study also concluded, consistent with our findings, that there was no correlation between the severity of periodontal disease and the overall sleep quality score (PSQI).

Emerging evidence suggests several biologically plausible pathways that may underlie the association between sleep disturbances and periodontal disease. Insufficient or poor-quality sleep is known to alter systemic immune function, leading to dysregulation of innate and adaptive responses. Reduced sleep duration elevates circulating pro-inflammatory mediators, impairs neutrophil activity, and disrupts host-microbial balance, mechanisms that collectively increase susceptibility to periodontal inflammation and tissue destruction. Conversely, periodontitis itself can adversely affect sleep quality through pain, discomfort, nocturnal symptoms, or reduced quality of life, suggesting a bidirectional relationship. Together, these mechanisms suggest a self-reinforcing cycle where chronic sleep disturbance exacerbates periodontal breakdown, and periodontal disease, in turn, impairs sleep, contributing to disease progression (Carra et al. 2017).

Unassessed factors such as stress and anxiety could also influence both sleep and periodontitis progression. These factors might offer an explanation

for our unexpected finding that patients with periodontitis reported better sleep (lower PSQI scores) than controls in some aspects, potentially modifying the observed relationship between sleep quality and periodontal status. Recent findings, for example, have demonstrated that poor sleep and psychological stress can exert synergistic effects on periodontal inflammation, amplifying the likelihood and severity of periodontitis beyond the independent influence of each factor (Marruganti et al. 2024). This interaction is biologically plausible, as both sleep disturbance and chronic stress contribute to heightened systemic inflammation, impaired immune regulation, and behavioral changes that can indirectly affect oral health. Therefore, inter-individual differences in stress levels could partially account for the variability observed in sleep-periodontitis associations. Furthermore, with age, these factors tend to accumulate, potentially leading to the manifestation of periodontal disease even though overall sleep patterns might normalize.

Both the current study and the broader literature present several limitations that impede direct comparisons across investigations. A primary limitation is the reliance on cross-sectional study designs, which inherently preclude conclusions regarding temporal or causal relationships between sleep disturbances and periodontal disease. Moreover, methodologies for assessing sleep vary significantly across studies, employing diverse metrics such as sleep duration, PSQI scores, actigraphy, or self-reported complaints, which contribute to substantial heterogeneity in reported outcomes. Differences in sample characteristics, diagnostic criteria for periodontitis, and the extent of adjustment for key confounders also vary considerably among investigations. These inconsistencies underscore the critical need for well-designed longitudinal studies that utilize standardized periodontal and sleep assessments to elucidate the directionality and underlying mechanisms of the observed associations (Muniz et al. 2021).

Conclusion

Sleep duration did not significantly differ between individuals with and without periodontitis. Paradoxically, patients with periodontitis reported a higher incidence of nocturnal disturbances (awakenings, nocturia, snoring/coughing, pain) but fewer daytime complaints (e.g., sleepiness, reduced enthusiasm). These patterns may indicate differences in symptom perception and daytime functioning rather than objective sleep duration itself. Given the observed age and socioeconomic imbalances between groups, residual confounding is likely. Future research should therefore employ objective sleep metrics and multivariable analyses to clarify the underlying mechanisms and directionality between sleep characteristics and periodontal status. Further prospective studies are essential to establish the precise effect of insufficient sleep on the development and progression of periodontitis.

Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statements

Ethical Committee of the Medical University of Sofia with protocol №17/23.07.2025.

The authors declared that no clinical trials were used in the present study.

The authors declared that no experiments on humans or human tissues were performed for the present study.

Informed consent from the humans, donors or donors' representatives: All inform consents have been deposited in Medical University - Sofia, Faculty of dental medicine.

The authors declared that no experiments on animals were performed for the present study.

The authors declared that no commercially available immortalised human and animal cell lines were used in the present study.

Use of AI

No use of AI was reported.

Funding

This research is supported by the Bulgarian Ministry of Education and Science under the National Program "Young Scientists and Postdoctoral Students –2".

Author contributions

All authors have contributed equally.

Author ORCIDs

Ivan Ivanov https://orcid.org/0000-0002-1048-6740
Emilia Naseva https://orcid.org/0000-0002-1282-8441
Angelika Velkova https://orcid.org/0000-0003-4594-9845

Data availability

All of the data that support the findings of this study are available in the main text.

References

Alhassani AA, Al-Zahrani MS (2020) Is inadequate sleep a potential risk factor for periodontitis? In: Bourgeois D (Ed.). PLoS ONE 15: e0234487. https://doi.org/10.1371/journal.pone.0234487

Besedovsky L, Lange T, Born J (2012) Sleep and immune function. Pflügers Archiv - European Journal of Physiology 463: 121–137. https://doi.org/10.1007/s00424-011-1044-0

Botelho J, Machado V, Leira Y, Proença L, Chambrone L, Mendes JJ (2022) Economic burden of periodontitis in the United States and Europe: An updated estimation. Journal of Periodontology 93: 373–379. https://doi.org/10.1002/JPER.21-0111

Carra MC, Rangé H, Caligiuri G, Bouchard P (2023) Periodontitis and atherosclerotic cardiovascular disease: A critical appraisal. Periodontology 2000: prd.12528. https://doi.org/10.1111/prd.12528

Carra MC, Schmitt A, Thomas F, Danchin N, Pannier B, Bouchard P (2017) Sleep disorders and oral health: a cross-sectional study. Clinical Oral Investigations 21: 975–983. https://doi.org/10.1007/s00784-016-1851-y

Consensus Conference Panel, Watson NF, Badr MS, Belenky G, Bliwise DL, Buxton OM, Buysse D, Dinges DF, Gangwisch J, Grandner MA, Kushida C, Malhotra RK, Martin JL, Patel SR, Quan SF, Tasali E (2015) Recommended Amount of Sleep for a Healthy Adult: A Joint Consensus Statement of the American Academy of Sleep Medicine and Sleep Research Society. Journal of Clinical Sleep Medicine 11: 591–592. https://doi.org/10.5664/jcsm.4758

Gupta CC, Vincent GE, Coates AM, Khalesi S, Irwin C, Dorrian J, Ferguson SA (2022) A Time to Rest, a Time to Dine: Sleep, Time-Restricted Eating, and Cardiometabolic Health. Nutrients 14: 420. https://doi.org/10.3390/nu14030420

Han D, Kim M, Kim S, Yoo J, Shen JJ (2022) Sleep time and duration are associated with periodontitis in a representative sample of Koreans. Journal of Periodontology 93: 210–219. https://doi.org/10.1002/JPER.20-0252

Herrera D, Sanz M, Shapira L, Brotons C, Chapple I, Frese T, Graziani F, Hobbs FDR, Huck O, Hummers E, Jepsen S, Kravtchenko O, Madianos P, Molina A, Ungan M, Vilaseca J, Windak A, Vinker S (2024) Periodontal diseases and cardiovascular diseases, diabetes, and respiratory diseases: Summary of the consensus report by the European Federation of Periodontology and WONCA Europe. European Journal of General Practice 30: 2320120. https://doi.org/10.1080/13814788.2024.2320120

Kamalian Mehrizi F, Hosseini Yekani A, Rashidi Maybodi F (2025) Association between Sleep Quality and Periodontal Status: A Case-Control Study. Journal of Dentistry 26.

Karaaslan F, Dikilitaş A (2019) The association between stage-grade of periodontitis and sleep quality and oral health-related quality of life. Journal of Periodontology 90: 1133–1141. https://doi.org/10.1002/JPER.19-0034

Lei F, Hu X (2024) Oral health and sleep disorders: A systematic review and meta-analysis. Biomedical Reports 22: 37. https://doi.org/10.3892/br.2024.1915

Marcenes W, Kassebaum NJ, Bernabé E, Flaxman A, Naghavi M, Lopez A, Murray CJL (2013) Global Burden of Oral Conditions in 1990–2010: A Systematic Analysis. Journal of Dental Research 92: 592–597. https://doi.org/10.1177/0022034513490168

Marruganti C, Suvan JE, D'Aiuto F (2023) Periodontitis and metabolic diseases (diabetes and obesity): Tackling multimorbidity. Periodontology 2000: prd.12536. https://doi.org/10.1111/prd.12536

Marruganti C, Gaeta C, Romandini M, Ferrari Cagidiaco E, Parrini S, Discepoli N, Grandini S (2024) Multiplicative effect of stress and poor sleep quality on periodontitis: A university-based cross-sectional study. Journal of Periodontology 95: 125–134. https://doi.org/10.1002/JPER.23-0209

Marzola P, Melzer T, Pavesi E, Gil-Mohapel J, Brocardo PS (2023) Exploring the Role of Neuroplasticity in Development, Aging, and Neurodegeneration. Brain Sciences 13: 1610. https://doi.org/10.3390/brainsci13121610

Muniz FWMG, Pola NM, Silva CFE, Silva FGD, Casarin M (2021) Are periodontal diseases associated with sleep duration or sleep quality? A systematic review. Archives of Oral Biology 129: 105184. https://doi.org/10.1016/j.archoralbio.2021.105184

Spiegel K, Tasali E, Penev P, Cauter EV (2004) Brief Communication: Sleep Curtailment in Healthy Young Men Is Associated with Decreased Leptin Levels, Elevated Ghrelin Levels, and Increased Hunger and Appetite. Annals of Internal Medicine 141: 846–850. https://doi.org/10.7326/0003-4819-141-11-200412070-00008

Taskov D, Alexiev F, Chipev P, Milanova M (2024) Screening for Sleep Disordered Breathing in Three Distinct Neurological Diseases in the Bulgarian Population. Proceedings of the Bulgarian Academy of Sciences 77(2): 289–297. https://doi.org/10.7546/CRABS.2024.02.15

Trindade D, Carvalho R, Machado V, Chambrone L, Mendes JJ, Botelho J (2023) Prevalence of periodontitis in dentate people between 2011 and 2020: A systematic review and meta-analysis of epidemiological studies. Journal of Clinical Periodontology 50: 604–626. https://doi.org/10.1111/jcpe.13769

Walker MP (2009) The Role of Sleep in Cognition and Emotion. Annals of the New York Academy of Sciences 1156: 168–197. https://doi.org/10.1111/j.1749-6632.2009.04416.x

Wang S, Li Z, Wang X, Guo S, Sun Y, Li G, Zhao C, Yuan W, Li M, Li X, Ai S (2022) Associations between sleep duration and cardiovascular diseases: A meta-review and meta-analysis of observational and Mendelian randomization studies. Frontiers in Cardiovascular Medicine 9: 930000. https://doi.org/10.3389/fcvm.2022.930000

Wiener RC (2016) Relationship of Routine Inadequate Sleep Duration and Periodontitis in a Nationally Representative Sample. Sleep Disorders 2016: 1–6. https://doi.org/10.1155/2016/9158195

Zhou Q, Ye F, Zhang S (2024) Sleep Duration and Risk of Periodontitis-A Systematic Review and Meta-Analysis. International Dental Journal 74: 418–425. https://doi.org/10.1016/j.identj.2024.02.016