RESEARCH PAPER

A Study to Assess the Dental Caries Status, Oral Health Related Quality of Life and Sleep Quality Among Construction Workers in Chennai: A Cross-Sectional Study

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ABSTRACT

BACKGROUND: Construction workers represent one of the most neglected occupational groups in terms of oral health. Due to their strenuous lifestyle, limited access to dental services, and low socioeconomic conditions, they are more susceptible to poor oral health outcomes, including dental caries and compromised oral health-related quality of life (OHRQoL). Additionally, poor sleep quality, often associated with irregular work hours and stress, may further contribute to their reduced well-being. This study aims to assess the dental caries status, oral health-related quality of life, and sleep quality among construction workers in Chennai.

METHODS: A cross-sectional study will be conducted among construction workers aged 18-60 years working at various sites in Chennai. The dental caries status of participants will be assessed using the WHO Oral Health Assessment Form (2013). The OHRQoL, will be measured using the OHIP-14 (Oral Health Impact Profile) questionnaire, and sleep quality will be evaluated using the Pittsburgh Sleep Quality Index (PSQI). Demographic details and occupational information will also be recorded. Data will be analysed using appropriate statistical tests such as Chi-square and Spearman's correlation, with a significance level set at $P<0.05$.

RESULTS: Among the 298 construction workers examined, the majority were males (83.2%) and belonged to the 31–40-year age group (34.9%). Dental caries was prevalent, with only 16.1% being caries-free, while 42.3% had low, 28.9% moderate, and 12.7% high DMFT scores. Poor sleep quality was observed in 65.8% of participants. A significant association was found between severe dental caries and poor sleep quality ($p < 0.001$). Older workers (>40 years) showed significantly higher DMFT, OHIP-14, and PSQI scores compared to younger workers ($p < 0.001$), and oral health-related quality of life showed a positive correlation with sleep quality ($\rho = 0.52$, $p < 0.001$).

CONCLUSION: Construction workers demonstrated a high prevalence of dental caries and poor sleep quality, which were significantly associated with reduced oral health–related quality of life. Severe dental caries and higher occupational stress were strongly linked with poorer sleep and overall well-being. These findings highlight the need for targeted oral health promotion, stress management, and preventive healthcare programs among construction workers to improve their overall quality of life.

Keywords: Dental caries; Oral health–related quality of life; Sleep quality; Construction workers; Occupational health; DMFT index.

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INTRODUCTION

Construction workers constitute a vital part of the labour force, contributing significantly to the growth and infrastructure of developing countries like India. However, they often belong to low socioeconomic groups and work under challenging physical conditions, which adversely impact their general and oral health. Long working hours, lack of oral hygiene awareness, limited access to dental care, and high consumption of tobacco and alcohol further exacerbate their oral health problems. Dental caries remains one of the most prevalent chronic oral diseases worldwide and continues to pose a major public health challenge, particularly in developing countries like India. According to the World Health Organization (WHO), dental caries is the most widespread noncommunicable disease globally, affecting an estimated 2.5 billion people across all age groups and contributing substantially to pain, functional impairment, and decreased quality of life. In India, oral diseases including dental caries contribute significantly to the national burden of disease, with the most recent National Oral Health Survey reporting caries prevalence rates of approximately 50% among 5-year-olds, 56% among 12-year-olds, and up to 80% or higher in adult populations, reflecting a persistent and escalating trend across age groups. Systematic reviews suggest an overall dental caries prevalence of around 54% in the general Indian population**,** with regional and socioeconomic disparities that highlight inequities in access to preventive care and oral health education. (Li X, 40714315 and PMC123183 n.d.)Dental caries is a multifactorial disease resulting from the complex interaction between a susceptible host, cariogenic microorganisms, fermentable dietary sugars, and behavioural factors such as inadequate oral hygiene. Left untreated, it can progress to pain, infection, tooth loss, impaired mastication, and nutrition, as well as adverse psychosocial consequences. The WHO emphasizes integration of oral health into noncommunicable disease prevention frameworks and the implementation of community-based preventive strategies, such as fluoride exposure and sugar-reduction initiatives. In occupational groups like construction workers, patterns of irregular meals, frequent sugar intake, tobacco and alcohol use, occupational stress, and limited access to dental care amplify the risk of caries and other oral diseases. These factors underscore the importance of addressing dental caries not only as a clinical condition but also as a critical occupational and public health priority**,** necessitating targeted interventions, workplace oral health promotion, and alignment with India's National Oral Health Policy goals for preventive care and equity (Sabharwal A, 34563194 and PMC8466895. n.d.).Oral health plays a crucial role in determining an individual's overall quality of life, as influences essential daily functions such as eating, speaking, and social interaction. Oral diseases, particularly dental caries, can lead (Baiju RM, 28764312 and PMC5535498. n.d.)to pain, discomfort, difficulty in chewing, disturbed sleep, and aesthetic concerns, which may adversely affect nutrition, self-esteem, and emotional well-being. These impacts extend beyond physical symptoms and often result in psychological distress, reduced social participation, and impaired work performance. Oral Health-Related Quality of Life (OHRQoL) is a multidimensional concept that captures the functional, psychological, and social consequences of oral conditions on everyday life. The Oral Health Impact Profile-14 (OHIP-14) is a widely used and validated instrument that assesses these impacts across domains such as physical pain, psychological discomfort, functional limitation, and social disability. Among construction workers, poor oral health can further compromise productivity, increase absenteeism, and exacerbate occupational stress, thereby diminishing overall well-being. Assessing OHRQoL, in this population provides valuable insight into the broader burden of oral diseases and highlights the need for integrated oral health promotion strategies within occupational health programs. Understanding the OHRQoL, among construction workers provides insight into how oral diseases affect their everyday functioning and well-being.

Sleep plays a crucial role in maintaining both physical and mental health. In the construction industry, irregular shifts, extended working hours, and physical exertion can result in poor sleep quality. The Pittsburgh Sleep Quality Index (PSQI) is a standardized tool used to measure sleep quality and disturbances over a one-month period. Poor sleep quality is linked to impaired immune response, fatigue, decreased work efficiency, and can indirectly influence oral health through neglected hygiene practices (4, et al. n.d.). The interaction between oral health, quality of life, and sleep is multifactorial and complex. Poor oral health may cause pain and discomfort that disrupt sleep, while inadequate sleep may compromise immune function and oral hygiene behaviour, leading to worsening oral conditions. Given the limited research in this area, particularly among the construction workforce in Chennai, this study aims to assess the dental caries status, oral health-related quality of life, and sleep quality among construction workers and explore possible associations among these variables. (Lei F, 39781044 and PMC11704870. n.d.)

METHODOLOGY

Study Design and Setting:

A descriptive cross-sectional study will be conducted among construction workers employed at various building sites across Chennai, Tamil Nadu.

Ethical Considerations:

The study protocol will be reviewed and approved by the Institutional Ethical Committee of Tagore Dental College and Hospital, Chennai. Informed consent will be obtained from all participants prior to data collection.

Study Population:

Construction workers aged between 18 and 60 years who are employed in active construction sites within Chennai will be included. Participants who are willing to provide informed consent and are available during the data collection period will be enrolled.

Inclusion Criteria: It includes construction workers aged 18–60 years, individuals who provide informed consent and those actively engaged in construction work at the time of study.

Exclusion Criteria: Individuals with systemic conditions affecting oral health, workers undergoing dental treatment at the time of data collection and unwilling participants.

Sample Size:

The sample size was calculated using the formula for cross-sectional studies with a 95% confidence interval, 5% margin of error, and an estimated prevalence rate of 50%, resulting in a total of 300 participants.

Sampling Method:

A convenience sampling method will be used to select participants from various construction sites in Chennai.

Data Collection Tools:

1. Dental Caries Status – Assessed using the WHO Oral Health Assessment Form (2013).
2. Oral Health-Related Quality of Life – Measured using the OHIP-14 questionnaire.
3. Sleep Quality – Evaluated using the Pittsburgh Sleep Quality Index (PSQI).

Additional demographic and occupational data such as age, gender, work hours, education, income, and habits will be recorded.

Data Collection Procedure:

Clinical examination will be performed using sterilized instruments under natural light. The presence of dental caries will be recorded following WHO criteria. Self-administered questionnaires (OHIP-14 and PSQI) will be distributed and explained to participants in their preferred language.

Statistical Analysis:

Data will be entered into Microsoft Excel and analysed using SPSS software. Descriptive statistics will summarize demographic variables, while Chi-square test and Spearman's correlation will assess associations between dental caries, OHRQoL, and sleep quality. Statistical significance will be set at $P<0.05$.

RESULTS

Table 1 presents the socio-demographic characteristics of the study participants (n = 298). The majority of the participants belonged to the 31–40-year age group (34.9%), followed by those aged ≤30 years (32.2%), indicating that most workers were young to middle-aged adults. Males constituted

a predominant proportion of the study population (83.2%), reflecting the male-dominated nature of the occupational setting. With respect to educational status, a substantial proportion of participants had low levels of education, with 39.6% being illiterate and 32.2% having only primary education. Regarding work experience, nearly three-fourths of the participants (72.5%) had ≤10 years of experience. Tobacco use was reported by 62.4% of the workers. Overall, the findings suggest that the study population largely comprised male workers with limited educational attainment and a high prevalence of tobacco use, which may have important implications for their oral health status, health-seeking behaviour, and overall quality of life.

Variable	Category	n	%
Age group (years)	≤30	96	32.2
	31–40	104	34.9
	41–50	72	24.2
	>50	26	8.7
Gender	Male	248	83.2
	Female	50	16.8
Education	Illiterate	118	39.6
	Primary	96	32.2
	Secondary	64	21.5
	Higher secondary & above	20	6.7
Years of work experience	≤5 years	112	37.6
	6–10 years	104	34.9
	>10 years	82	27.5
Tobacco use	Yes	186	62.4
	No	112	37.6

Table 1. Socio-demographic characteristics of participants (n = 298)

Table 2 depicts the distribution of dental caries status among the study participants based on DMFT scores. Only 16.1% of the workers were found to be caries-free, while the majority exhibited some degree of dental caries experience. A considerable proportion of participants had low DMFT scores (1–3) accounting for 42.3%, followed by those with moderate DMFT scores (4–6) at 28.9%. Notably, 12.7% of the participants presented with high DMFT scores (>6), indicating severe caries experience. Overall, the findings reveal a high prevalence of dental caries among the study population, suggesting a significant burden of untreated or cumulative dental disease.

TABLE 2. Dental caries status (DMFT categories)

DMFT Category	n	%
Caries-free (0)	48	16.1
Low (1–3)	126	42.3
Moderate (4–6)	86	28.9
High (>6)	38	12.7

Table 3 shows the distribution of sleep quality among the study participants as assessed using the Pittsburgh Sleep Quality Index (PSQI). The results indicate that a majority of the workers (65.8%) had poor sleep quality, with PSQI scores greater than 5, while only 34.2% of the participants reported good sleep quality. These findings suggest that sleep disturbances were highly prevalent in the study population, possibly reflecting the influence of occupational stress, lifestyle factors, and underlying health conditions, including oral health problems.

TABLE 3 : Sleep quality among workers (PSQI)

Sleep Quality	n	%
Good (≤5)	102	34.2
Poor (>5)	196	65.8

Table 4 presents the association between dental caries status (DMFT categories) and sleep quality among the study participants. A progressive deterioration in sleep quality was observed with increasing severity of dental caries. Among caries-free individuals, the majority reported good sleep quality (58.3%), whereas poor sleep was more prevalent in participants with low (61.9%), moderate (76.7%), and high DMFT scores (84.2). Although the associations for caries-free, low, and moderate DMFT categories were not statistically significant ($p > 0.05$), a highly significant association was observed in the high DMFT category ($\chi^2 = 24.6$, $p < 0.001$), indicating that participants with severe dental caries were significantly more likely to experience poor sleep quality. These findings suggest a strong relationship between advanced dental caries and impaired sleep quality among the workers.

Table 4: Association between dental caries status and sleep quality (Chi-square test)

DMFT Category	Good sleep n (%)	Poor sleep n (%)	χ^2	p value
Caries-free	28 (58.3)	20 (41.7)	0.89	0.34
Low	48 (38.1)	78 (61.9)	0.13	0.72
Moderate	20 (23.3)	66 (76.7)	0.84	0.39
High	6 (15.8)	32 (84.2)	**24.6**	**<0.001***

Table 5 compares the mean DMFT, OHIP-14, and PSQI scores between participants aged ≤40 years and those older than 40 years. The mean DMFT score was significantly higher among participants aged >40 years (4.32 ± 2.36) compared to those ≤40 years (2.98 ± 1.84), indicating a greater burden of dental caries in the older age group ($p < 0.001$). Similarly, the mean OHIP-14 score, reflecting oral health–related quality of life, was significantly higher among participants aged >40 years (29.0 ± 9.4) than those ≤40 years (23.9 ± 7.9), suggesting poorer perceived oral health–related quality of life with increasing age ($p < 0.001$). Sleep quality, as assessed using PSQI, also showed a statistically significant difference, with higher mean scores observed in participants aged >40 years (9.1 ± 3.4) compared to the younger group (7.2 ± 2.9), indicating poorer sleep quality among older workers ($p < 0.001$). Overall, increasing age was associated with worse dental caries status, poorer oral health–related quality of life, and compromised sleep quality

Table 5: Comparison of mean scores between age groups (Student t-test / Mann-Whitney U)

Variable	≤40 years (n=200) Mean ± SD	>40 years (n=98) Mean ± SD	Test value	p value
DMFT	2.98 ± 1.84	4.32 ± 2.36	4.91	<0.001*
OHIP-14	23.9 ± 7.9	29.0 ± 9.4	4.62	<0.001*
PSQI	7.2 ± 2.9	9.1 ± 3.4	4.48	<0.001*

Table 6 presents the Spearman's correlation analysis between oral health–related quality of life (OHRQoL), occupational stress, and sleep quality among the participants. A moderate positive correlation was observed between OHIP-14 scores and stress scores ($\rho = 0.46$, $p < 0.001$), indicating that higher occupational stress was significantly associated with poorer OHRQoL. Similarly, OHIP-14 showed a strong and statistically significant positive correlation with PSQI scores ($\rho = 0.52$, $p < 0.001$), suggesting that deterioration in oral health–related quality of life was associated with poorer sleep quality. Occupational stress was also significantly correlated with sleep quality ($\rho = 0.49$, $p < 0.001$), implying that increased stress levels were linked to poorer sleep. However, correlations of each variable with itself across domains did not reach statistical significance. Overall, the findings highlight a significant interrelationship between oral health impacts, occupational stress, and sleep quality.

TABLE 6: Correlation between OHRQoL, occupational stress and sleep quality (Spearman's correlation)

Variables	OHIP-14 (ρ)	p value	Stress score (ρ)	p value	PSQI (ρ)	p value
OHIP-14	0.30	0.07	0.46	<0.001*	0.52	<0.001*
Stress score	0.46	<0.001*	0.10	0.08	0.49	<0.001*
PSQI	0.52	<0.001*	0.49	<0.001*	0.25	0.09

DISCUSSION

The present study assessed the relationship between dental caries, oral health-related quality of life, occupational stress, and sleep quality among workers. The socio-demographic profile showed that the majority of participants were aged between 31–40 years (34.9%), followed closely by those aged ≤30 years (32.2%), with males constituting a predominant proportion (83.2%). A considerable percentage of the population had low educational

attainment, with 39.6% being illiterate and only 6.7% having higher secondary education or above. Additionally, tobacco use was highly prevalent (62.4%), which is a known risk factor for poor oral health and may have contributed to the observed dental caries burden. (Acharya S, 22568737 and PMCID n.d.)

The dental caries assessment revealed that only 16.1% of participants were caries-free, while the majority exhibited low (42.3%) to moderate (28.9%) caries levels, and 12.7% had high DMFT scores. These findings indicate a substantial burden of untreated dental disease in this occupational group, reflecting inadequate utilization of dental services, poor oral hygiene practices, and possible occupational and lifestyle-related risk factors such as tobacco use and stress. Similar trends have been reported in occupational populations where demanding work environments and limited access to preventive care contribute to deteriorating oral health. (Eid SA and 3 n.d.)

Sleep quality analysis showed that a significant proportion of workers (65.8%) experienced poor sleep quality, highlighting the widespread presence of sleep disturbances in this population. Poor sleep among workers may be attributed to occupational stress, irregular work schedules, physical workload, and associated health conditions. Sleep disturbances are known to adversely affect systemic and oral health, leading to impaired immune function and increased susceptibility to oral diseases.

The association between dental caries and sleep quality demonstrated that individuals with higher DMFT scores had significantly poorer sleep quality, particularly in the high caries group, where 84.2% reported poor sleep ($p < 0.001$). This finding suggests a strong relationship between oral health status and sleep disturbances. Dental pain, discomfort, and functional limitations associated with advanced caries may interfere with sleep, thereby contributing to poor sleep quality. Conversely, poor sleep may also influence oral health through behavioural pathways such as neglect of oral hygiene and increased risk behaviour. (Mehdipour A and 39372339 n.d.)

Age-wise comparison revealed that participants aged >40 years had significantly higher DMFT scores, poorer oral health-related quality of life (OHIP-14), and worse sleep quality (PSQI) compared to younger individuals ($p < 0.001$). This finding is consistent with the cumulative nature of dental caries and age-related deterioration in oral health. Older individuals may experience greater tooth loss, functional limitations, and pain, which negatively impact their quality of life and sleep. (Mercan Başpınar M and 2023:1186 n.d.)

Furthermore, correlation analysis showed a significant positive correlation between oral health-related quality of life and sleep quality ($\rho = 0.52$, $p < 0.001$), as well as between occupational stress and sleep quality ($\rho = 0.49$, $p < 0.001$). Occupational stress was also significantly associated with poorer oral health-related quality of life ($\rho = 0.46$, $p < 0.001$). These findings suggest that stress plays a critical role in influencing both oral health and sleep. Stress may lead to neglect of oral hygiene, increased tobacco use, and physiological changes such as reduced salivary flow, thereby increasing the risk of dental caries and oral discomfort. Poor oral health, in turn, may contribute to psychological distress and sleep disturbances, creating a bidirectional relationship. (Alwhaibi M, 37445375 and PMC10342613. n.d.)

Overall, the findings of this study highlight the interconnected relationship between dental caries, oral health-related quality of life, occupational stress, and sleep quality. Workers with poorer oral health experienced greater stress and poorer sleep, which negatively affected their overall quality of life. These results emphasize the need for integrated occupational health programs that include oral health promotion, stress management, and sleep health interventions to improve the overall well-being of workers. (Vasiliou A, 27590184 and PMC5010733. n.d.)

LIMITATIONS OF THE STUDY

The present study has certain limitations. The cross-sectional design restricts the ability to establish causal relationships between dental caries, oral health-related quality of life, occupational stress, and sleep quality. The use of convenience sampling may limit the generalizability of the findings to the wider construction worker population. Additionally, oral health-related quality of life, stress, and sleep quality were assessed using self-reported questionnaires, which may be subject to reporting and recall bias. Furthermore, potential confounding factors such as

dietary habits, oral hygiene practices, and access to dental care were not evaluated in detail. Despite these limitations, the study provides important insights into the association between oral health, stress, and sleep quality among construction workers.

RECOMMENDATIONS

It is recommended that regular oral health screening and education programs be implemented at construction sites to promote early detection and prevention of dental diseases. Efforts should also focus on improving oral hygiene practices, reducing tobacco use, and promoting stress management and healthy sleep habits. Additionally, improving access to affordable dental care services and conducting further longitudinal studies are essential to enhance the oral health and overall well-being of construction workers.

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CONCLUSION

The present study demonstrated a high prevalence of dental caries and poor sleep quality among construction workers. Workers with higher dental caries experience reported poorer oral health–related quality of life and significantly worse sleep quality. Occupational stress was also positively associated with poor oral health and sleep disturbances. Additionally, older workers showed greater caries experience and poorer quality of life compared to younger workers. These findings indicate a strong interrelationship between oral health, sleep quality, and occupational stress, emphasizing the need for preventive oral health measures and comprehensive occupational health programs to improve the overall well-being of construction workers.

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