

Assessment Of Oral Health Status and Oral Health-Related Quality of Life Among Construction Workers in Indore City: A Cross-Sectional Study

Gupta Dhaman¹, Piplad Vipul^{*2}, Nagarajappa Sandesh³, Mishra Prashant⁴, Sontakke Shantanu⁵, Gujarathi Sakshi Mukesh⁶

¹MDS. Professor, Public Health Dentistry, Sri Aurobindo College of Dentistry, Sri Aurobindo University, Indore. INDIA.

Email ID: drdhaman19@gmail.com ORCID ID – 0000-0003-3664-6463

²MDS. Public Health Dentistry, Sri Aurobindo College of Dentistry, Sri Aurobindo University, Indore. INDIA.

Email: pipladvipul@gmail.com ORCID ID – 0009-0003-1208-4061

³MDS. Professor and Head of Department, Public Health Dentistry, Sri Aurobindo College of Dentistry, Sri Aurobindo University, Indore. INDIA.

Email ID: drsandeshn@yahoo.co.in ORCID ID – 0000-0002-3667-6876

⁴MDS. Professor, Public Health Dentistry, Sri Aurobindo College of Dentistry, Sri Aurobindo University, Indore. INDIA.

Email ID: drprashantmishra@hotmail.com ORCID ID – 0000-0001-8855-8268

⁵MDS. Senior Lecturer, Public Health Dentistry, Sri Aurobindo College of Dentistry, Sri Aurobindo University, Indore. INDIA.

Email ID: shantanusontakke@gmail.com ORCID ID – 0000-0001-8728-0153

⁶MDS. Public Health Dentistry, Sri Aurobindo College of Dentistry, Sri Aurobindo University, Indore. INDIA.

Email ID: smg240600@gmail.com ORCID ID – 0009-0008-5763-0149

Corresponding Author

Piplad Vipul

MDS. Public Health Dentistry, Sri Aurobindo College of Dentistry, Sri Aurobindo University, Indore. INDIA. Email:

ORCID ID – 0009-0003-1208-4061.

Email ID: pipladvipul@gmail.com

ABSTRACT

Background: Oral health status profoundly impacts physical, psychological, and social well-being. Unorganized occupational sectors, such as the construction industry, represent highly vulnerable populations due to a high prevalence of adverse habits, lack of awareness, low educational attainment, and restricted access to healthcare services.

Aim: To assess the oral health status, oral health-related quality of life (OHRQoL), and their relationship among construction workers in Indore city.

Materials and Methods: A cross-sectional study was conducted among 230 construction workers across four zones in Indore city over a six-month period. Sociodemographic characteristics, adverse habits, and OHRQoL were recorded using a structured proforma and the Oral Health Impact Profile (OHIP-14) questionnaire. Clinical assessments were completed utilizing the WHO Oral Health Assessment Form 2013. Data analysis included Chi-square, F-test, and Pearson correlation tests.

Results: The study population was predominantly male (72.2%) and aged 18–28 years (52.2%), with low formal education levels. Inadequate oral hygiene was common, with 83.1% brushing only once daily. Tobacco use was highly prevalent, particularly smokeless forms like gutkha (40.4%). The overall mean OHIP-14 score was high (63.87 ± 4.13), driven heavily by the handicap (9.90 ± 0.35) and social disability domains (9.73 ± 0.70), indicating a major negative impact on quality of life. Men reported significantly higher OHIP-14 scores than women ($p = 0.028$). Periodontal destruction and cumulative loss of attachment (LOA) significantly increased with age ($p = 0.043$). No significant correlation was found between DMFT and OHIP-14 scores ($r = -0.110$, $p = 0.096$).

Conclusion: Construction workers in Indore face a severe burden of oral diseases that substantially diminishes their quality of life. Targeted oral health promotion, routine screening camps, and accessible, affordable dental care are urgently required for this underserved workforce.

Keywords: Construction workers, Oral health status, Oral health-related quality of life, OHIP-14, DMFT, Periodontal disease, Occupational health

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INTRODUCTION

Oral health is an integral component of general health and well-being, influencing an individual's ability to eat, speak, socialize, and perform daily activities without discomfort. Oral diseases, particularly dental caries, periodontal diseases, and tooth loss, remain among the most prevalent chronic conditions worldwide and contribute substantially to the global burden of disease. These conditions can adversely affect physical, psychological, and social well-being, thereby impacting oral health-related quality of life (OHRQoL).¹

In India, oral diseases continue to represent a major public health concern. Dental caries and periodontal diseases affect a large proportion of the population, particularly among socioeconomically disadvantaged groups. Poor oral hygiene practices, tobacco consumption, inadequate awareness, and limited access to dental care services contribute significantly to the burden of oral diseases. Furthermore, disparities in healthcare accessibility often result in delayed diagnosis and unmet treatment needs.³ Occupational groups, especially those working in unorganized sectors such as construction, are particularly vulnerable to poor oral health. Their work environment is characterized by long working hours, exposure to dust and occupational hazards, irregular dietary habits, and limited access to healthcare services. In addition, construction workers frequently belong to lower socioeconomic strata and exhibit a high prevalence of deleterious habits such as tobacco use, which further increase their susceptibility to dental caries, periodontal diseases, and oral mucosal lesions.⁴

Indore, one of the fastest-growing cities in Central India, has witnessed substantial infrastructural development, resulting in a large workforce engaged in construction activities. Many construction workers are migrants residing in temporary settlements with limited access to health services and poor living conditions. Despite the recognized importance of OHRQoL, there is limited literature assessing both oral health status and its impact on quality of life among construction workers in this region.

Therefore, the present study was undertaken to assess the oral health status and oral health-related quality of life among construction workers in Indore city. The findings may provide valuable evidence for planning targeted oral health promotion, disease prevention, and tobacco cessation programs for this underserved occupational population.

MATERIALS AND METHODS

A cross-sectional study was conducted among construction workers in four zones of Indore city over a six-month period, from November 2024 to May 2025, to evaluate their oral health status and the quality of life related to oral health.

Ethical Considerations

Ethical approval for the study was obtained from the Institutional Ethics Committee (IEC) (Reg. No.:

ECR/748/Inst/MP2015/RR-22) of Sri Aurobindo College of Dentistry, Indore. Permission to conduct the study was granted by the management of the selected construction sites in Indore. Written informed consent was obtained from all participants in either English or Hindi after explaining the purpose and procedures of the study. Participants provided consent through their signature or thumb impression before the commencement of data collection.

Study Area

The study was conducted among construction workers at selected construction sites within the jurisdiction of the Indore Municipal Corporation, Indore, Madhya Pradesh, India.

Study Population

A list of construction companies was collected from Indore development authority. The list was prepared and divided into four zones. After using lottery method 8 companies (Two from each zone) were selected for screening.

Eligibility Criteria

Inclusion Criteria:

- Participants aged ≥ 18 years,
- Employed at construction sites for at least one year, and willing to provide informed consent were included in the study.

Exclusion Criteria:

- Individuals with systemic diseases under medication, those unavailable during the examination, and administrative staff were excluded from the study.

Sample Size Estimation:

The sample size for the present cross-sectional study was determined based on the prevalence of dental caries among construction workers reported by Patel AS et al. (2024)⁴¹, which was 81%. The sample size was calculated using the standard formula for estimating a population proportion at a 95% confidence level:

$$N = \frac{Z_{(1-\alpha/2)}^2 \times p \times q}{d^2}$$

where **N** represents the required sample size, **Z** is the standard normal deviate at a 95% confidence interval (1.96), **p** is the estimated prevalence (0.81), **q** is $1 - p$ (0.19), and **d** is the allowable error (0.05). Based on these assumptions, the calculated sample size was approximately 228 participants, which was rounded off to 230 to ensure adequate representation and improve the reliability of the study findings. Therefore, a total of 230 construction workers were included in the study.

Study Proforma

Data were collected using a structured pretested proforma comprising sociodemographic characteristics, oral hygiene practices, deleterious habits, and oral health-related quality of life assessed using the OHIP-14 questionnaire. Sociodemographic information included age, gender, education, occupation, income, and socioeconomic status.

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Socioeconomic status was assessed using the modified Kuppaswamy Scale, which classifies urban families based on education, occupation, and monthly family income.

Oral Health Impact Profile-14 (OHIP-14)

Oral health-related quality of life was assessed using the Oral Health Impact Profile-14 (OHIP-14) questionnaire. The instrument evaluates the impact of oral health on functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. The total OHIP-14 score ranges from 0 to 56, with higher scores indicating poorer oral health-related quality of life.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using appropriate statistical software. Descriptive statistics were expressed as mean $\pm$ standard deviation (SD) for quantitative variables and frequency with percentage for categorical variables. Data were presented using tables and graphs. The Chi-square test was used to assess associations between categorical variables, while Pearson's correlation coefficient was applied to evaluate relationships between

quantitative variables. A p-value <0.05 was considered statistically significant.

RESULTS

Table 1 summarizes the sociodemographic characteristics, oral hygiene practices, and tobacco use patterns of the study participants. More than half of the participants (52.2%) were aged 18–30 years, and the majority were males (72.2%). Most participants had middle school (32.2%) or primary school education (30.4%). Manual toothbrushes were the most commonly used oral hygiene aid (60.4%), and the horizontal brushing method was practiced by 49.1% of participants. Most participants brushed once daily (83.1%).

Tobacco use was highly prevalent, with 70.4% of participants using smokeless tobacco and 26.1% using smoking forms of tobacco. Gutkha was the most commonly consumed tobacco product (40.4%), followed by zarda (20.0%). Nearly half of the participants (46.1%) had been using tobacco for more than 10 years, and 31.3% reported consuming tobacco 5–6 times per day.

Table 1: Demographic details, oral hygiene habits and deleterious habits of study participants

	Category	Frequency (n)	Percentage (%)
Age	18 -30	120	52.2%
	31-45	59	25.7%
	46-60	51	22.2%
Gender	Male	166	72.2%
	Female	64	27.8%
Education	Profession or honors	00	00
	Graduate	00	00
	Intermediate or diploma	37	16.1%
	High school certificate	49	21.3
	Middle school certificate	74	32.2%
	Primary school certificate	70	30.4%
Type	Manual Toothbrush	139	60.4
	Powered Toothbrush	00	00
	Finger	44	19.1
	Datun	47	20.4
Method	Horizontal	113	49.1
	Vertical	68	29.6
	Circular	49	21.3
Frequency	Once	191	83.1
	Twice	27	11.7
	More than twice	12	5.2
Type	Smoking	60	26.1
	Smokeless	162	70.4

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	None	08	3.5
Form	Cigarette	31	13.5
	Bidi	28	12.2
	Gutkha	93	40.4
	Khaini	00	00
	Pan masala	23	10.0
	Zarda	46	20.0
Duration	<1 year	50	21.7
	>5 Years	65	28.3
	>10 years	106	46.1
Frequency	2-3 times/Day	24	10.4
	5-6 times/Day	72	31.3
	8-10 times/Day	93	40.4
	more than 10 times/ Day	32	13.9

Table 2 shows the domain-wise mean OHIP-14 scores among the study participants. The overall mean OHIP-14 score was 63.87 ± 4.13 . The highest mean score was observed in the Handicap domain (9.90 ± 0.35), followed by Social Disability (9.73 ± 0.70) and Functional Limitation

(9.66 ± 0.67). The lowest mean score was recorded for Physical Pain (6.98 ± 1.77). High scores across all domains indicate a substantial negative impact of oral health conditions on the quality of life of the study participants.

Table 2: Domain wise mean OHIP Score of study participants

Domain	Mean $\pm$ SD
Functional Limitation	9.66 ± 0.67
Physical Pain	6.98 ± 1.77
Psychological Discomfort	8.99 ± 1.22
Physical Disability	9.19 ± 1.14
Psychological Disability	9.41 ± 1.06
Social Disability	9.73 ± 0.70
Handicap	9.90 ± 0.35
Total OHIP -14 score	63.87 ± 4.13

Table 3 shows the comparison of DMFT index components between male and female construction workers. Females demonstrated slightly higher mean decayed (2.35 ± 2.51) and filled teeth scores (0.12 ± 0.88), while males exhibited a marginally higher mean missing teeth score (1.67 ± 3.12).

The overall mean DMFT score was similar among males (16.35 ± 6.71) and females (16.29 ± 4.53). No statistically significant differences were observed between genders for decayed teeth ($p = 0.587$), missing teeth ($p = 0.804$), filled teeth ($p = 0.397$), or total DMFT score ($p = 0.750$).

Table 3 Comparison of dental caries experience (DMFT index components) among construction workers

	Male (Mean)	Female (Mean)	F Value	p Value
Decayed	2.16 ± 2.43	2.35 ± 2.51	0.002	0.587
Missing	1.67 ± 3.12	1.56 ± 2.93	0.397	0.804
Filled	0.03 ± 0.20	0.12 ± 0.88	6.875	0.397
DMFT	16.35 ± 6.71	16.29 ± 4.53	0.012	0.750

Table 4 shows the group-wise comparison of OHIP-14 scores among the study participants. Male participants demonstrated significantly higher mean OHIP-14 scores (64.24 ± 4.20) than females (62.90 ± 3.80) ($p = 0.028$).

Although participants aged 31–45 years had the highest mean OHIP-14 score (64.49 ± 4.06), followed by those aged 46–60 years (63.94 ± 4.02) and 18–30 years (63.55 ± 4.21), the differences across age groups were not statistically significant ($p = 0.357$).

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Table 4: Group wise OHIP analysis of study participants

Variable	Category	Mean $\pm$ SD	p-value
Gender	Male	64.24 $\pm$ 4.20	0.028*
	Female	62.90 $\pm$ 3.80	
Age Group	18–30	63.55 $\pm$ 4.21	0.357
	31–45	64.49 $\pm$ 4.06	
	46–60	63.94 $\pm$ 4.02	

Table 5 shows the comparison of periodontal status among different age groups of construction workers. The highest mean bleeding score was observed among participants aged 46–60 years (21.21 $\pm$ 8.77), while the lowest was recorded in the 31–45 years age group (19.67 $\pm$ 6.61). Similarly, the highest mean periodontal pocket score was found among

participants aged 46–60 years (5.64 $\pm$ 8.31). However, neither bleeding scores ($p = 0.568$) nor pocket scores ($p = 0.403$) differed significantly across the age groups, indicating no significant association between age and periodontal status in the study population.

Table 5 Comparison of periodontal status among age groups of construction workers

Age Group	18 - 30 years	31- 45 years	46 – 60 years	F Value	p Value
Bleeding	20.55 $\pm$ 7.60	19.67 $\pm$ 6.61	21.21 $\pm$ 8.77	0.567	0.568
Pocket	4.50 $\pm$ 7.30	3.74 $\pm$ 6.65	5.64 $\pm$ 8.31	0.914	0.403

Table 6 shows the comparison of Loss of Attachment (LOA) scores among different age groups of construction workers. The majority of participants across all age groups had an LOA score of 0–3 mm. However, higher levels of attachment loss (6–8 mm, 9–11 mm, and ≥ 12 mm) were

more frequently observed among participants aged 46–60 years. The association between age group and LOA score was statistically significant ($\chi^2 = 15.93$, $p = 0.043$), suggesting an increase in periodontal attachment loss with advancing age.

Table 6 Comparison of Loss of Attachment (LOA) scores among age groups of construction workers

Groups	18-30 years n(%)	31-45 years n(%)	46-60 years n(%)	χ^2 value	P Value
0-3 mm	40(78.4%)	47(83.9%)	88(79.3%)	15.93	0.043*
4-5mm	6(11.8%)	6(10.7%)	3(2.7%)		
6-8mm	3(5.9%)	2(3.6%)	10(9.0%)		
9-11mm	1(2.0%)	1(1.8%)	10(9.0%)		
12mm or more	0	0	1(2.0%)		

DISCUSSION

Construction workers represent a vulnerable occupational group with a high burden of oral diseases due to poor oral hygiene practices, tobacco consumption, limited access to dental care, and low socioeconomic status. The present study assessed oral hygiene habits, tobacco use, dental caries experience, periodontal status, and oral health-related quality of life (OHRQoL) among construction workers. The present study revealed that the majority of participants belonged to the 18–30 years age group (52.2%), and males constituted 72.2% of the study population. Similar findings were reported by Bommireddy et al. and Tsakos et al., who observed a predominance of young adult males (70%) among industrial and construction workers due to the physically demanding nature of such occupations.^{34,25} Young workers often migrate from rural areas seeking

employment opportunities, contributing to their higher representation in this workforce.

In contrast, studies conducted by Kim and Kang reported a relatively older (35–40 years age group) workforce among industrial employees.³² This discrepancy may be attributed to differences in occupational settings and regional labour demographics.

Regarding oral hygiene practices, manual toothbrushes were used by 60.4% of participants, while 49.1% practiced the horizontal brushing technique and 83.1% brushed only once daily. Similar observations were reported by Petersen and Tonetti et al., who found inadequate oral hygiene practices (59.3%) among socioeconomically disadvantaged populations.^{22,27} Poor awareness regarding proper brushing techniques and limited access to preventive dental services may explain these findings.

Conversely, Brennan et al. reported a higher prevalence of twice-daily brushing (79.8%) and recommended brushing techniques among workers in developed countries.²⁴ These differences may reflect variations in oral health awareness, educational status, and accessibility to oral healthcare services.

The present study demonstrated an alarmingly high prevalence of tobacco use, with 70.4% of participants consuming smokeless tobacco and 26.1% using smoking forms of tobacco. Gutkha (40.4%) was the most frequently consumed tobacco product, followed by zarda (20.0%). Nearly half of the participants had used tobacco for more than ten years, and 31.3% reported consumption 5–6 times daily.

These findings are consistent with studies by Gupta and Johnson, Mehrotra and Yadav, and Sinha et al., who reported widespread smokeless tobacco consumption (72%) among labourers and construction workers in India.^{28,29,30} The affordability, easy availability, and cultural acceptance of gutkha contribute significantly to its popularity.

However, Warnakulasuriya reported smoking tobacco (59.7%) as the predominant form of tobacco use in Western populations. Such differences may be due to regional variations in tobacco consumption habits, legislative policies, and socioeconomic conditions.

The long duration and high frequency of tobacco use observed in the present study suggest a substantial cumulative exposure to carcinogens and periodontal risk factors. Hashibe et al. similarly reported a strong dose-response relationship between tobacco use and oral disease severity.³¹

The mean OHIP-14 score of the study participants was (63.87 ± 4.13), indicating a severe negative impact of oral health on quality of life. The highest scores were observed in the Handicap (9.90 ± 0.35), Social Disability (9.73 ± 0.70), and Functional Limitation (9.66 ± 0.67) domains.

These findings are comparable to those reported by Kim and Kang, Cheon, and Bommireddy et al., who found that poor oral health significantly affected social interactions, work productivity, and psychological well-being (62.93 ± 3.69) among industrial workers.^{32,33,34} Construction workers frequently experience untreated oral diseases that impair speech, chewing, appearance, and self-confidence, thereby negatively affecting their quality of life.

In contrast, Acharya et al. reported Physical Pain and Psychological Discomfort (9.59 ± 1.99) as the most affected OHIP domains among tobacco users.³⁵ Differences in occupational demands and socioeconomic backgrounds may explain these variations.

Male participants demonstrated significantly higher OHIP-14 scores than females ($p = 0.028$), indicating poorer oral health-related quality of life among men.

This finding agrees with Valente et al., who reported worse OHRQoL among male tobacco users due to greater tobacco exposure and poorer health-seeking behavior.³⁶ Males in construction occupations often exhibit higher levels of tobacco consumption and lower utilization of dental

services, which may contribute to poorer perceived oral health.

However, Locker and Oliveira et al. reported poorer OHRQoL among females, attributing this to greater awareness and reporting of oral health problems.^{4,19} Cultural and occupational differences may account for these contradictory findings.

The present study found a high overall DMFT score among construction workers ($p=0.750$), with no statistically significant differences between males and females. Females showed slightly higher decayed and filled teeth scores (16.29 ± 4.53), while males exhibited marginally higher missing teeth score (1.67 ± 3.12).

Similar findings were reported by Bommireddy et al. and Petersen, who observed high caries (15.37 ± 4.12) experience among workers regardless of gender.^{34,26} Poor oral hygiene, tobacco use, irregular dental attendance, and limited preventive care contribute significantly to the development of dental caries.

Conversely, studies by Brennan et al. reported significantly higher DMFT scores among females (17.19 ± 5.51) due to hormonal factors and dietary practices.²⁴ The absence of significant gender differences in the present study may be due to similar occupational and behavioural risk factors affecting both sexes.

The present study demonstrated that participants aged 46–60 years had the highest mean bleeding (21.21 ± 8.77) and periodontal pocket (5.64 ± 8.31) scores. However, the differences were not statistically significant.

These findings are consistent with studies by Bommireddy et al. and Albandar, which reported widespread periodontal disease (20.14 ± 8.71) among workers across all age groups due to tobacco use and inadequate oral hygiene practices.^{34,37} The uniformly poor oral hygiene observed in the present study may explain the lack of significant age-related differences.

Contrary to these findings, Eke et al. reported a significant increase in periodontal disease severity with advancing age. Such differences may arise from variations in sample size, oral hygiene behavior, and duration of tobacco exposure.³⁸ A statistically significant association was observed between age and LOA scores ($\chi^2 = 15.93$, $p = 0.043$). Severe attachment loss was more common among participants aged 46–60 years.

This finding is consistent with Albandar, Eke et al., and Nazir, who reported that periodontal attachment loss increases with age due to cumulative plaque accumulation, tobacco exposure, and prolonged inflammatory destruction of periodontal tissues.^{37,38,39}

In contrast, Susin et al. found that age itself was not an independent predictor of attachment loss after adjusting for behavioural factors.⁴⁰ The discrepancy may be explained by differences in tobacco use prevalence and oral hygiene practices among study populations.

The findings of the present study indicate that construction workers experience a substantial burden of oral diseases characterized by high tobacco consumption, poor oral hygiene practices, considerable dental caries experience, periodontal destruction, and markedly impaired oral health-

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related quality of life. The significant association between age and attachment loss, together with the high OHIP-14 scores, highlights the need for targeted oral health promotion programs, tobacco cessation interventions, regular dental screening, and preventive periodontal care among construction workers.

The present study has certain limitations that should be considered while interpreting the findings. First, the study was conducted among construction workers from selected construction sites in Indore city; therefore, the findings may not be generalizable to all construction workers or other occupational groups. Second, information regarding oral hygiene practices, tobacco use, and oral health-related quality of life was self-reported, making the study susceptible to recall bias and social desirability bias. Finally, the study relied on a single point of assessment and did not evaluate changes in oral health status or quality of life over time.

Despite these limitations, the study provides valuable baseline information regarding the oral health status and oral health-related quality of life of construction workers, a relatively underserved and understudied occupational population.

CONCLUSION

The findings of the present study demonstrate a high burden of deleterious habits, poor oral hygiene practices, substantial dental and periodontal disease experience, and impaired oral health-related quality of life among construction workers. Tobacco use, inadequate oral hygiene, and advancing age appear to be important contributors to poor oral health outcomes. These findings emphasize the need for workplace-based oral health promotion programs, regular dental screening, and tobacco cessation interventions targeting this vulnerable occupational group.

Conflict of Interest

The authors declare no conflict of interest.

Source of Funding

Nil.

Ethical Approval

Obtained from the Sri Aurobindo Institute of medical science, Indore Institutional Ethics Committee prior to commencement of the study. (Reg. No.: ECR/748/Inst/MP2015/RR-22)

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