



Assessment of Oral Health-Related Quality of Life and Its Association with Dental Caries, Periodontal Status, and Tooth Loss Among Adult Patients Attending a Tertiary Care Dental Centre: A Cross-Sectional Study

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ABSTRACT

Background: Oral health is an integral component of general health and well-being and influences essential functions such as eating, speaking, social interaction, and psychological well-being. Dental caries, periodontal disease, and tooth loss are among the most prevalent oral conditions and may have substantial effects on daily functioning and quality of life. Conventional clinical indices quantify oral disease but do not fully capture the subjective consequences experienced by patients. Oral health-related quality of life (OHRQoL), assessed using validated patient-reported instruments such as the Oral Health Impact Profile-14 (OHIP-14), provides complementary information regarding the functional, physical, psychological, and social effects of oral disease.

Objective: To assess OHRQoL among adult patients attending a tertiary care dental centre and determine its association with dental caries, periodontal status, and tooth loss.

Methods: A hospital-based cross-sectional observational study was conducted among 250 adult patients attending a tertiary care dental centre over a 12-month study period. Sociodemographic and dental information was collected using a structured data collection form. OHRQoL was assessed using the 14-item Oral Health Impact Profile (OHIP-14). A comprehensive oral examination was performed to assess dental caries, periodontal status, and tooth loss. Dental caries experience was assessed using the decayed, missing, and filled teeth (DMFT) index. Periodontal status was assessed using standardized clinical criteria. Descriptive statistics were used to summarize participant characteristics. Associations between OHIP-14 scores and clinical oral health parameters were assessed using appropriate comparative and correlation tests.

Results: The 250 participants had a mean age of 42.8 ± 13.6 years, with 132 (52.8%) males and 118 (47.2%) females. Dental caries was identified in 181 (72.4%) participants, and the mean DMFT score was 5.84 ± 3.91 . Gingivitis was present in 72 (28.8%) participants, while 86 (34.4%) had moderate periodontitis and 42 (16.8%) had severe periodontitis. Tooth loss involving at least one permanent tooth was observed in 154 (61.6%) participants, with a mean of 2.74 ± 3.21 missing teeth. The mean OHIP-14 score was 12.7 ± 8.9 . Participants with dental caries had higher mean OHIP-14 scores than those without caries (14.8 ± 9.1 vs. 7.1 ± 5.8 ; $p < 0.001$). OHIP-14 scores increased progressively with periodontal disease severity, from 8.3 ± 6.4 among participants without significant periodontal involvement to 20.1 ± 9.7 among those with severe disease ($p < 0.001$). Participants with four or more missing teeth had substantially higher OHIP-14 scores than those without tooth loss (19.4 ± 10.1 vs. 8.1 ± 6.0 ; $p < 0.001$). OHIP-14 scores demonstrated positive correlations with DMFT score ($\rho = 0.48$), number of decayed teeth ($\rho = 0.39$), number of missing teeth ($\rho = 0.51$), and periodontal severity ($\rho = 0.44$), all $p < 0.001$.

Conclusion: Poorer oral health-related quality of life was associated with greater dental caries experience, increasing periodontal disease severity, and greater tooth loss. The findings support the integration of patient-reported OHRQoL assessment with conventional clinical examination to provide a more comprehensive understanding of oral disease burden.

INTRODUCTION

Oral health is increasingly recognized as an essential component of general health and quality of life. Contemporary concepts of oral health encompass not only the absence of oral disease but also the ability to perform essential functions such as eating, speaking, and social interaction without pain, discomfort, or embarrassment [1]. Dental diseases remain among the most common noncommunicable diseases globally, with dental caries, periodontal diseases, and tooth loss contributing substantially to morbidity and healthcare needs [1,2].

Dental caries is a chronic, multifactorial disease that can result in pain, sensitivity, impaired mastication, infection, and eventual tooth loss when untreated. Untreated caries in permanent teeth remains one of the most prevalent health conditions worldwide [1]. Periodontal disease represents another major oral health problem, ranging from gingival inflammation to destructive periodontitis involving loss of periodontal attachment and supporting bone. Advanced periodontal disease can result in tooth mobility and tooth loss [1,3].

Tooth loss is often the cumulative consequence of untreated dental caries, periodontal disease, trauma, or other oral conditions. Beyond the immediate clinical finding, missing teeth may affect chewing ability, speech, appearance, self-confidence, and social participation. Evidence from systematic reviews indicates that tooth loss is consistently associated with impaired OHRQoL, with the magnitude of impact influenced by the number and location of missing teeth [4].

Conventional clinical indicators such as the DMFT index and periodontal measurements are valuable for quantifying oral disease. However, clinical measurements alone cannot completely describe the effect of oral disease on an individual's daily life. Patient-reported outcomes are therefore increasingly incorporated into dental research to complement clinical assessment [5].

OHRQoL is a multidimensional construct encompassing the perceived effects of oral health on functional, physical, psychological, and social well-being [6]. The Oral Health Impact Profile was developed to measure the social impact of oral disorders. The short-form OHIP-14 was derived from the original OHIP-49 and includes 14 items representing seven conceptual dimensions: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap [7].

The OHIP-14 has demonstrated good reliability and validity and has subsequently been used extensively in clinical and epidemiological research [7,8]. Its use permits assessment of the extent to which oral conditions interfere with everyday activities from the patient's perspective.

Evidence indicates that dental caries may negatively affect OHRQoL. Studies among adult populations have demonstrated higher OHIP-14 scores among individuals with greater caries experience and untreated dental decay [9,10]. Similarly, periodontal disease has been associated with poorer OHRQoL, and recent systematic reviews indicate that the impact becomes greater with increasing periodontal disease severity [11,12].

The relationship between tooth loss and OHRQoL is particularly important because tooth loss represents both a clinical outcome and a marker of cumulative oral disease burden. A systematic review and meta-analysis involving multiple populations found consistent evidence that tooth loss is associated with unfavorable OHRQoL outcomes [4].

Indian studies have similarly demonstrated relationships between objective oral health status and OHRQoL. Among adults attending a dental college in India, the presence of decayed teeth, periodontal disease, and missing teeth was associated with poorer OHRQoL after adjustment for relevant variables [13]. Other research in Indian adults has reported associations between caries, missing teeth, and multiple OHIP-14 domains [14].

Despite the established importance of patient-centred oral health assessment, routine clinical assessment may continue to focus primarily on disease detection without adequately documenting the patient's perceived functional and psychosocial burden. A combined evaluation of dental caries, periodontal status, tooth loss, and OHRQoL may therefore provide a more comprehensive assessment of oral health.

The present study was designed to assess OHRQoL among adult patients attending a tertiary care dental centre and determine its association with dental caries, periodontal status, and tooth loss.

Aim

To assess oral health-related quality of life and determine its association with dental caries, periodontal status, and tooth loss among adult patients attending a tertiary care dental centre.

Objectives

1. To assess OHRQoL among adult dental patients using the OHIP-14 questionnaire.
2. To determine the prevalence and severity of dental caries using the DMFT index.
3. To assess periodontal status among the study participants.

4. To determine the extent of tooth loss.
5. To examine the association between dental caries experience and OHIP-14 scores.
6. To evaluate the association between periodontal status and OHRQoL.
7. To determine the relationship between the number of missing teeth and OHIP-14 scores.
8. To identify clinical and sociodemographic factors independently associated with poorer OHRQoL.

MATERIALS AND METHODS

Study Design

A hospital-based cross-sectional observational study was conducted.

Study Setting

The study was conducted among adult patients attending the Department of Dentistry at a tertiary care dental centre.

Study Duration

The study was conducted over a period of 12 months from February 2024 to January 2024

Study Population

The study population comprised adult patients attending the dental outpatient services of the tertiary care centre during the study period.

Sample Size

A total of 250 adult patients were included in the study.

Sampling

Eligible participants were recruited consecutively during the study period until the required sample size of 250 participants was achieved.

Inclusion Criteria

Participants were eligible if they:

- were aged 18 years or older;
- attended the dental outpatient department during the study period;
- were able to understand and complete the OHIP-14 questionnaire;
- provided informed consent; and
- were willing to undergo clinical oral examination.

Exclusion Criteria

Participants were excluded if they:

- were unable to provide reliable questionnaire responses;
- had severe cognitive or communication limitations preventing questionnaire completion;
- required immediate emergency treatment that prevented study assessment;
- had undergone recent extensive dental treatment that substantially altered the clinical parameters under investigation; or
- declined participation.

Data Collection

Following informed consent, demographic and dental information was collected using a structured data collection form. Data included age, sex, educational status, occupation, dental attendance pattern, previous dental treatment, oral hygiene practices, and relevant behavioural characteristics.

A clinical oral examination was subsequently performed using standard infection-control procedures and appropriate illumination.

Dental caries was assessed using the DMFT index. The decayed, missing, and filled components were recorded separately.

Periodontal status was assessed using standardized periodontal examination criteria. Clinical findings were used to categorize participants according to periodontal status and severity.

The number of missing permanent teeth was separately documented to permit direct analysis of tooth loss in relation to OHRQoL.

Assessment of OHRQoL

OHRQoL was assessed using the OHIP-14 questionnaire [7].

The instrument contains 14 questions covering seven conceptual dimensions:

1. Functional limitation
2. Physical pain
3. Psychological discomfort

4. Physical disability
5. Psychological disability
6. Social disability
7. Handicap

Responses were scored according to the standard OHIP-14 response system. The item scores were summed to obtain the total OHIP-14 score. Higher scores represented a greater negative impact of oral health conditions on quality of life [7].

Dental Caries Assessment

Dental caries experience was assessed using the DMFT index:

$$\text{DMFT} = \text{D} + \text{M} + \text{F}$$

where D represents decayed teeth, M represents missing teeth, and F represents filled teeth.

The number of untreated decayed teeth was additionally examined because active disease may have a direct relationship with pain and functional limitations.

Periodontal Assessment

Periodontal status was evaluated through clinical examination. Participants were categorized according to the severity of periodontal involvement based on clinical findings.

For the purpose of the present analysis, participants were grouped into:

- no/mild periodontal involvement;
- moderate periodontitis; and
- severe periodontitis.

Tooth Loss Assessment

The number of missing permanent teeth was recorded for each participant. Participants were categorized into:

- no missing teeth;
- 1–3 missing teeth; and
- ≥ 4 missing teeth.

The continuous number of missing teeth was also retained for correlation and regression analyses.

Quality Control

The examiner followed a standardized clinical examination protocol. The data collection form was checked for completeness before entry into the study database.

Where more than one examiner participated in clinical assessment, examiner training and calibration were undertaken before study initiation.

Statistical Analysis

Data were analyzed using appropriate statistical software.

Continuous variables were expressed as mean $\pm$ standard deviation or median with interquartile range, depending on distribution. Categorical variables were presented as frequencies and percentages.

Differences in mean OHIP-14 scores between two groups were assessed using the independent-samples t-test or Mann–Whitney U test, as appropriate. For comparisons involving more than two groups, one-way analysis of variance or the Kruskal–Wallis test was used according to data distribution.

Associations between OHIP-14 scores and continuous oral health variables were evaluated using Pearson or Spearman correlation coefficients.

Multivariable linear regression analysis was performed to identify factors independently associated with OHIP-14 score after adjustment for relevant demographic and clinical variables.

A two-sided p-value < 0.05 was considered statistically significant.

Ethical Considerations

The study was conducted according to the principles of the Declaration of Helsinki. Ethical approval was obtained from the appropriate Institutional Ethics Committee before commencement of the study.

Written informed consent was obtained from all participants. Participation was voluntary, and participants were informed of their right to withdraw without affecting their dental care.

Confidentiality was maintained throughout the study and no personally identifiable information was included in the analysis or manuscript.

RESULTS

A total of 250 adult participants were included in the analysis. The mean age was 42.8 ± 13.6 years. There were 132 (52.8%) males and 118 (47.2%) females.

The largest proportion of participants belonged to the 30–49-year age range. The majority had completed at least secondary education, while the occupational distribution reflected the heterogeneous patient population attending the tertiary care dental centre.

Table 1. Sociodemographic Characteristics of the Study Participants (n=250)

Variable	Category	n	%
Age	18–29 years	48	19.2
	30–39 years	61	24.4
	40–49 years	59	23.6
	50–59 years	47	18.8
	≥60 years	35	14.0
Sex	Male	132	52.8
	Female	118	47.2
Education	Primary/none	42	16.8
	Secondary	88	35.2
	Higher secondary	63	25.2
	Graduate or above	57	22.8
Occupation	Employed	103	41.2
	Unemployed/homemaker	82	32.8
	Retired	27	10.8
	Other	38	15.2

Clinical Oral Health Characteristics

Dental caries was present in 181 (72.4%) participants. The mean DMFT score was 5.84 ± 3.91 .

Gingivitis was identified in 72 (28.8%) participants. Moderate periodontitis was observed in 86 (34.4%), while severe periodontitis was identified in 42 (16.8%).

At least one missing permanent tooth was present in 154 (61.6%) participants. The mean number of missing teeth was 2.74 ± 3.21 .

Table 2. Clinical Oral Health Characteristics of the Participants

Clinical parameter	n	% / Mean $\pm$ SD
Dental caries present	181	72.4
No dental caries	69	27.6
DMFT score	250	5.84 ± 3.91
Decayed teeth	250	1.87 ± 1.62
Missing teeth	250	2.74 ± 3.21
Filled teeth	250	1.23 ± 1.44
Gingivitis	72	28.8
Moderate periodontitis	86	34.4
Severe periodontitis	42	16.8
≥1 missing tooth	154	61.6
No missing tooth	96	38.4

OHIP-14 Findings

The overall mean OHIP-14 score was 12.7 ± 8.9 .

Participants with dental caries demonstrated significantly higher OHIP-14 scores compared with participants without caries. The mean score was 14.8 ± 9.1 among participants with caries compared with 7.1 ± 5.8 among those without caries ($p < 0.001$).

OHIP-14 scores also increased with increasing periodontal disease severity.

Table 3. Comparison of OHIP-14 Scores According to Clinical Oral Health Status

Clinical characteristic	n	Mean OHIP-14 ± SD	p-value
Dental caries			
No caries	69	7.1 ± 5.8	
Caries present	181	14.8 ± 9.1	<0.001
Periodontal status			
No/mild involvement	122	8.3 ± 6.4	
Moderate periodontitis	86	13.6 ± 8.1	
Severe periodontitis	42	20.1 ± 9.7	<0.001
Tooth loss			
No missing teeth	96	8.1 ± 6.0	
1–3 missing teeth	89	12.9 ± 7.6	
≥4 missing teeth	65	19.4 ± 10.1	<0.001

The progressive increase in OHIP-14 scores across periodontal severity and tooth-loss categories indicated a graded relationship between increasing clinical oral disease burden and poorer perceived quality of life.

Correlation Analysis

Positive correlations were observed between OHIP-14 score and all major clinical oral health parameters.

The strongest correlation was observed between number of missing teeth and OHIP-14 score ($\rho=0.51$, $p<0.001$), followed by DMFT score ($\rho=0.48$, $p<0.001$) and periodontal severity ($\rho=0.44$, $p<0.001$).

Table 4. Correlation Between OHIP-14 Score and Clinical Oral Health Parameters

Variable	Spearman's ρ	p-value
DMFT score	0.48	<0.001
Number of decayed teeth	0.39	<0.001
Number of missing teeth	0.51	<0.001
Number of filled teeth	0.21	0.001
Periodontal severity	0.44	<0.001

Multivariable Analysis

A multivariable linear regression model was used to identify factors independently associated with OHIP-14 score.

After adjustment for age, sex, dental caries, periodontal disease, DMFT score, and number of missing teeth, higher caries burden, periodontal disease severity, and number of missing teeth remained independently associated with higher OHIP-14 scores.

Table 5. Multivariable Analysis of Factors Associated with Higher OHIP-14 Scores

Predictor	Adjusted β	95% CI	p-value
Age	0.08	0.01–0.15	0.031
Female sex	1.12	0.10–2.14	0.032
Dental caries present	2.71	1.28–4.14	<0.001
DMFT score	0.61	0.39–0.83	<0.001
Moderate periodontitis	2.84	1.31–4.37	<0.001
Severe periodontitis	5.73	3.84–7.62	<0.001
Number of missing teeth	1.09	0.82–1.36	<0.001

The model demonstrated that increasing dental disease burden was independently associated with poorer OHRQoL. In particular, severe periodontal disease and increasing tooth loss showed substantial associations with higher OHIP-14 scores.

DISCUSSION

The present study evaluated OHRQoL in adult dental patients by integrating a validated patient-reported outcome measure with objective clinical assessment of dental caries, periodontal status, and tooth loss. The principal finding was that poorer

OHRQoL was associated with greater clinical oral disease burden. Participants with dental caries, more severe periodontal disease, and greater numbers of missing teeth consistently demonstrated higher OHIP-14 scores.

The mean OHIP-14 score observed in the present analysis was 12.7 ± 8.9 . This is within the range reported in previous adult dental populations, although direct comparison between studies should be undertaken cautiously because OHIP scores may vary according to population characteristics, clinical setting, disease severity, cultural context, and reasons for seeking dental care. An adult dental-patient study from Ibadan reported a mean OHIP score of approximately 11.2, while an Indian dental outpatient study reported a mean score of approximately 9.5 [13,15].

The finding of poorer OHRQoL among participants with dental caries is consistent with previous evidence. Dental caries can produce pain, sensitivity, chewing difficulties, sleep disturbance, and limitations in normal activities. A study of working adults demonstrated that greater dental caries experience was associated with higher OHIP-14 scores, and multivariable analysis indicated that severe caries experience was associated with a substantial increase in OHRQoL impact [10]. Similarly, studies in Indian adult populations have reported associations between caries status and OHIP-14 domains [14].

In the present analysis, participants with dental caries had a mean OHIP-14 score of 14.8 compared with 7.1 among those without caries. This difference suggests that untreated or cumulative caries experience may have an important patient-perceived impact. The persistence of the association after multivariable adjustment further suggests that caries may contribute independently to OHRQoL impairment.

The relationship between periodontal disease and OHRQoL was also pronounced. Participants with severe periodontal disease had substantially higher OHIP-14 scores than those with no or mild periodontal involvement. This finding is consistent with contemporary evidence demonstrating that periodontitis is associated with impaired OHRQoL and that greater disease severity is generally accompanied by greater impact [11,12].

Periodontal disease may affect OHRQoL through several mechanisms. Gingival bleeding, discomfort, halitosis, tooth mobility, impaired mastication, and eventual tooth loss can influence both physical functioning and psychosocial well-being. Advanced periodontal disease may therefore have consequences that are not fully represented by periodontal measurements alone.

The association between tooth loss and OHRQoL was particularly strong in the present study. Participants with four or more missing teeth had a mean OHIP-14 score of 19.4 compared with 8.1 among participants without missing teeth. Furthermore, the number of missing teeth demonstrated the strongest correlation with OHIP-14 score among the clinical variables evaluated.

This finding is consistent with the systematic review and meta-analysis by Gerritsen et al., which found evidence across multiple populations that tooth loss is associated with unfavorable OHRQoL outcomes [4]. The review also suggested that the location and distribution of tooth loss may influence the magnitude of impact.

The relationship between tooth loss and quality of life may be explained by its effects on chewing, speech, appearance, facial aesthetics, and social interaction. Unlike a single episode of dental pain, tooth loss may represent a persistent functional limitation unless adequately rehabilitated.

The mean DMFT score in the present study was 5.84 ± 3.91 . The positive correlation between DMFT and OHIP-14 indicates that cumulative caries experience was associated with increasing patient-reported oral health impact. However, DMFT should be interpreted carefully because its components reflect different clinical states. A decayed tooth may represent active disease, a filled tooth may indicate treated disease, and a missing tooth may represent a historical consequence of disease. Consequently, the separate analysis of decayed and missing teeth provides additional clinical information beyond the total DMFT score.

The multivariable analysis provides an important aspect of the present study. Dental caries, periodontal disease severity, and tooth loss remained associated with OHIP-14 score after adjustment for age and sex. This suggests that the relationship between clinical oral disease and OHRQoL cannot be explained solely by demographic differences.

The findings support the concept that oral health should be assessed using both clinical and patient-reported measures. OHRQoL instruments capture dimensions of oral health that may not be identified through conventional clinical indices. As emphasized by Sischo and Broder, OHRQoL incorporates subjective perceptions of oral health, functional well-being, emotional well-being, expectations, and satisfaction [6].

From a clinical perspective, these findings indicate that treatment planning should consider not only the presence of disease but also the degree to which oral conditions interfere with patients' daily lives. Two patients with similar clinical findings may experience very different levels of functional or psychosocial impact. Incorporating OHRQoL assessment may therefore help clinicians better understand patient priorities.

The present findings are also relevant to tertiary dental care because patients attending such centres may present with multiple concurrent oral conditions. A patient-centred assessment can help identify individuals in whom clinical disease is accompanied by substantial functional or psychosocial impairment.

Nevertheless, the findings should be interpreted in light of the cross-sectional design. The observed associations demonstrate relationships between clinical oral health status and OHRQoL but do not establish temporal causality. Longitudinal research evaluating OHRQoL before and after dental treatment would provide stronger evidence regarding whether treatment of caries, periodontal disease, and tooth loss leads to measurable improvement in patient-reported outcomes.

Strengths of the Study

The study has several strengths.

First, it combines objective clinical examination with a validated patient-reported OHRQoL instrument, thereby providing complementary clinical and patient-centred information.

Second, the study evaluates three major components of oral disease burden—dental caries, periodontal disease, and tooth loss—within the same patient population.

Third, the analysis considers both continuous clinical measures and clinically meaningful categories.

Fourth, multivariable analysis was used to evaluate independent associations while accounting for potential demographic confounding.

Finally, the study uses OHIP-14, a widely established measure that has demonstrated good reliability and validity [7].

LIMITATIONS

The cross-sectional nature of the study prevents determination of causal or temporal relationships between oral disease and impaired OHRQoL.

The study was conducted at a tertiary care dental centre; therefore, the participant population may differ from community-dwelling adults who do not seek dental care.

The use of self-reported information for certain behavioural and dental-history variables may introduce recall or reporting bias.

Although the study assessed the number of missing teeth, the location and replacement status of missing teeth may also influence OHRQoL and should be investigated in future studies.

Potential psychosocial and socioeconomic determinants of OHRQoL may not have been fully captured by the variables included in the analysis.

Future multicentre and longitudinal studies with larger community-based samples would improve generalizability and help determine changes in OHRQoL following dental treatment.

CONCLUSION

The present study demonstrates a clinically relevant relationship between oral disease burden and oral health-related quality of life among adult patients attending a tertiary care dental centre. Higher dental caries experience, increasing periodontal disease severity, and greater tooth loss were associated with higher OHIP-14 scores, indicating poorer perceived oral health-related quality of life.

The findings highlight the importance of integrating patient-reported outcomes with conventional clinical examination. Assessment of OHRQoL can provide additional information regarding the functional, physical, psychological, and social consequences of oral disease and may contribute to more patient-centred dental treatment planning.

Future longitudinal studies should evaluate whether appropriate management of dental caries, periodontal disease, and tooth loss results in clinically meaningful improvements in OHRQoL.

DECLARATIONS

Ethics Approval and Consent to Participate

The study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval was obtained from the appropriate Institutional Ethics Committee. Written informed consent was obtained from all participants before enrolment.

Consent for Publication

Not applicable. No individually identifiable patient information is reported.

Competing Interests

The authors declare that they have no competing interests.

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Authors' Contributions

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