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Evaluating Oral Health-Related Quality of Life (OHRQoL) and Oral Health Needs of Geriatric Patients

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ABSTRACT

Objective: Aging has a profound impact on oral health, contributing to diminished functional capacity and reduced quality of life. Oral health-related quality of life (OHRQoL) is increasingly recognized as a public health concern, yet limited data exist for the geriatric population in Pakistan. To evaluate oral health needs and OHRQoL in the geriatric population in Lahore, Pakistan.
Methods: A cross-sectional study was conducted at the Dental Teaching Hospital, University of Lahore, from September 2023 to January 2024 using non-probability sampling. Clinical oral health status was assessed using the decayed, missing, and filled teeth (DMFT) index and the Basic Periodontal Examination (BPE). OHRQoL was measured using the General Oral Health Assessment Index (GOHAI), and oral health needs were evaluated using the Oral Health Assessment Tool (OHAT) to complement clinical findings with a comprehensive assessment of oral conditions. Data were analyzed using SPSS version 25. Statistical tests included Pearson correlation, independent-sample t-tests, and one-way ANOVA with Bonferroni post hoc correction. Effect sizes and 95% confidence intervals were reported.
Results: A total of 170 geriatric patients were included. The mean DMFT score was 10.29 ± 5.86, with a mean of 6.14 ± 5.17 missing teeth, and the mean BPE score was 2.41 ± 0.61. Poor oral cleanliness was significantly associated with higher BPE scores ($p = 0.003$, $r = 0.32$), and missing teeth were associated with increased dental pain ($p = 0.004$, $r = 0.28$). Lower education correlated with lower GOHAI scores ($p = 0.003$, $\eta^2 = 0.07$). The mean GOHAI score was 38.14 ± 3.53, indicating moderate OHRQoL.
Conclusion: Geriatric patients demonstrated high levels of dental caries, tooth loss, and periodontal disease, all of which contributed to reduced OHRQoL. Strengthening preventive care, oral hygiene education, restorative services, and gerodontology training is essential to improve oral health outcomes and enhance the quality of life of older adults, particularly those from underserved groups.

Keywords: DMF index; Geriatric dentistry; Oral health; Periodontal index; Quality of life

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Introduction

The oral cavity plays a fundamental role in overall health, enabling essential functions such as eating, speaking, and social interaction. The World Health Organization (WHO) defines oral health as a state that supports functional, psychological, and social well-being, underscoring its importance in maintaining quality of life across the lifespan. [1] Despite this centrality, oral diseases remain a major global public health burden, affecting an estimated 3.5 billion people worldwide and disproportionately impacting vulnerable populations, including older adults. [2] Aging is accompanied by complex physiological changes, multimorbidity, polypharmacy, and functional decline, all of which heighten susceptibility to dental caries, periodontal disease, tooth loss, xerostomia, and oral infections. These oral conditions compromise mastication, speech, nutrition, aesthetics, and psychosocial functioning, ultimately diminishing oral health-related quality of life (OHRQoL). [3]

The demographic transition toward an aging global population further magnifies the urgency of addressing geriatric oral health. By 2030, one in six individuals worldwide will be 60 years or older, and by 2050, this proportion will approach one in five, with the greatest increase occurring in low- and middle-income countries. [4] Pakistan reflects this global trend, with older adults currently representing approximately 6% of the population, a figure projected to triple by 2050. As the elderly population expands, so too does the need for specialized approaches in oral healthcare. Gerodontology has emerged to address these needs, acknowledging that age-related changes in saliva composition, systemic health, and manual dexterity necessitate tailored preventive and therapeutic strategies. [5] The high prevalence of dental caries among individuals over 65 years, the increasing frequency of edentulism in the late 70s, and the early onset of periodontal disease between 60 and 65 years underscore a substantial geriatric oral disease burden. [5] Moreover, the bidirectional relationship between oral and systemic diseases, such as periodontitis exacerbating diabetes, cardiovascular conditions, and chronic inflammation, highlights the consequences of neglecting oral health in older adults.

Although the role of effective oral hygiene practices in preventing dental caries, periodontal disease, and associated systemic complications is well established, global evidence consistently shows that adherence to these practices varies widely. High-income countries have implemented structured oral-health awareness programs, community-based preventive initiatives, fluoridation policies, and routine screening systems that have significantly improved population-level oral health outcomes, particularly among older adults. [6] In contrast, many low- and middle-income countries continue to struggle with behavioral, educational, and structural barriers that impede the adoption of healthy oral hygiene practices. Psychosocial determinants such as stress, limited self-efficacy, and low health literacy further exacerbate these challenges. In Pakistan, geriatric oral health remains especially underserved, with older adults facing restricted access to dental services, minimal emphasis on preventive care, economic limitations, and the absence of dedicated national geriatric oral-health programs. [7] These systemic gaps are further compounded by a lack of comprehensive epidemiological data, hindering the development of targeted interventions for this rapidly growing segment of the population.

Existing literature in Pakistan primarily focuses on clinical indicators such as the decayed, missing, and filled teeth (DMFT) index or the basic periodontal examination (BPE), offering valuable yet incomplete insights into disease severity and treatment needs. [8, 9] However, clinical indices alone do not fully capture the functional, psychosocial, and subjective dimensions of oral health that influence daily life in older adults. OHRQoL frameworks emphasize that oral health assessments must integrate both objective findings and patient-reported outcomes to provide a holistic understanding of well-being. [8] International studies have utilized validated tools such as the Oral Health Assessment Tool (OHAT) to evaluate clinical conditions and the Geriatric Oral Health Assessment Index (GOHAI) to assess quality-of-life impacts, but such multidimensional evaluations remain limited in Pakistani geriatric populations. [10, 11] The absence of studies that simultaneously apply DMFT, BPE, OHAT, and GOHAI represents a significant evidence gap, hindering the development of targeted oral health policies and age-specific interventions.

Given the increasing geriatric population, the persistent burden of oral disease, and limited national data on both clinical and subjective dimensions of oral health, there is a pressing need for comprehensive assessments in Pakistan. Understanding how clinical oral health correlates with functional limitations, psychosocial concerns, and overall OHRQoL is essential for designing effective community-based programs, strengthening preventive strategies, and optimizing restorative care for older adults. Such insights can guide gerodontology training, capacity building among dental professionals, and the integration of geriatric oral health into broader public health frameworks.

In view of these considerations, the present study aims to evaluate oral health status, oral health needs, and OHRQoL among geriatric patients in Lahore using a combined assessment approach. By integrating objective clinical indices (DMFT, BPE) with validated tools that measure oral health conditions (OHAT) and subjective quality-of-life impacts (GOHAI), this study provides a multidimensional understanding of geriatric oral health in Pakistan.

Materials and Methods

Study Design and Settings

A cross-sectional study was conducted at the Teaching Dental Hospital, University College of Dentistry, University of Lahore, Pakistan, over five months from September 2023 to January 2024. The investigation aimed to assess clinical oral health status, oral health needs, and oral health-related quality of life (OHRQoL) among geriatric patients seeking dental care. Ethical approval was obtained prior to study initiation from the University of Lahore Ethics of Research Committee (ANDC/IRC/585/07/29). Written informed consent was obtained from all participants after a clear explanation of the study objectives and procedures.

Participants and Eligibility Criteria

Participants were eligible if they were 65 years of age or older, dentate or partially dentate, and able to provide informed consent. Exclusion criteria included cognitive impairment, communication or language barriers, and any condition preventing completion of the clinical examination or interview. Consecutive patients meeting eligibility criteria were recruited using a non-probability, convenience sampling approach.

Data Collection Procedures

Data collection comprised three components: (1) a structured questionnaire recording demographic information, education, and socioeconomic status; (2) comprehensive clinical oral examinations; and (3) assessment of OHRQoL through a validated questionnaire. All examinations were performed chairside using standard dental instruments under adequate illumination.

Clinical Oral Health Assessments

Caries Assessment (DMFT Index)

Dental caries experience was quantified using the Decayed, Missing, and Filled Teeth (DMFT) index. All 28 permanent teeth were examined; third molars and teeth missing or restored for non-carious reasons were excluded. A mouth mirror and explorer were used to visually inspect each tooth surface. Scores ranged from 0 to 28, with higher values indicating greater cumulative caries experience.

Periodontal Assessment (Basic Periodontal Examination)

Periodontal status was evaluated using the Basic Periodontal Examination (BPE) in accordance with the 2019 British Society of Periodontology guidelines. A pre-calibrated CPITN probe was used to record the highest code per sextant:
0 = healthy; 1 = bleeding after probing; 2 = presence of calculus or plaque-retentive factors; 3 = probing depth 3.5–5.5 mm; 4 = probing depth > 5.5 mm. The mean BPE score was calculated to summarize periodontal health across the sample.

Oral Health Assessment Tool (OHAT)

Oral health needs were assessed using the Oral Health Assessment Tool (OHAT), a validated instrument designed to evaluate clinical oral conditions. OHAT assesses eight domains—lips, tongue, gums and tissues, saliva, natural teeth, denture teeth, oral cleanliness, and dental pain—each scored from 0 (healthy) to 2 (pathological condition). Higher scores denote poorer oral health. OHAT was included to capture clinical needs beyond those identified by DMFT and BPE.

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Assessment of Oral Health-Related Quality of Life

General Oral Health Assessment Index (GOHAI)

Contextual OHRQoL was measured using the Urdu-validated version of the Geriatric Oral Health Assessment Index (GOHAI). The 12-item GOHAI evaluates three domains: physical function, psychosocial function, and pain/discomfort. Responses were recorded on a five-point Likert scale (1 = always to 5 = never). Nine negatively worded items were scored directly, whereas three positively worded items were reverse-coded. Total GOHAI scores ranged from 12 to 60, with higher scores indicating better OHRQoL.

Rationale for Using Both OHAT and GOHAI

OHAT provided an objective assessment of clinical oral health conditions, whereas GOHAI captured patient-perceived functional and psychosocial impacts. Using both tools enabled a multidimensional evaluation of geriatric oral health and quality of life. Education and socioeconomic status were also recorded to explore their potential influence on OHRQoL.

Sample Size Determination

Sample size was calculated using OpenEpi based on an estimated dental caries prevalence of 35% among adults aged ≥65 years. Assuming a 95% confidence level, 5% margin of error, and accounting for a 10% non-response rate, the minimum required sample size was 155. A total of 170 participants were recruited, exceeding the minimum requirement and providing adequate statistical power.

Statistical Analysis

Data were analyzed using SPSS version 25. Continuous variables were summarized as means ± standard deviations, and categorical variables as frequencies and percentages. The Shapiro–Wilk test was used to assess the normality of continuous variables.

Bivariate analyses examined relationships between clinical measures and OHRQoL outcomes. Pearson correlation assessed associations between continuous variables (e.g., oral cleanliness vs. BPE scores; missing teeth vs. dental pain). Independent-sample t-tests compared continuous outcomes between two groups, while one-way ANOVA evaluated differences across more than two groups, including comparisons of GOHAI scores across education levels. When ANOVA results were significant, Bonferroni-adjusted post-hoc comparisons were conducted. Effect sizes were reported as Pearson r, Cohen's d, or η^2, accompanied by 95% confidence intervals.

Missing data were minimal (<5%) and handled through listwise deletion. Given the cross-sectional design and limited sample size, only bivariate analyses were performed; multivariable modeling was not feasible, restricting the ability to identify independent predictors of OHRQoL. Statistical significance was set at $p < 0.05$ (two-tailed).

Results

Participant Characteristics

A total of 170 geriatric patients participated in the study. Demographic characteristics are summarized in Table 1. Most respondents were male (64.1%), and more than half had completed school education (49.9%), while 12.4% were illiterate and 38.2% were university graduates. Nearly half of the participants were retired (44.7%), followed by housewives (35.3%) and working professionals (8.2%).

Table 1. Demographic Characteristics of the Study Population (n = 170)

Variable	Category	n (%)
Gender	Male	109 (64.1%)
	Female	61 (35.9%)
Education	Illiterate	21 (12.4%)
	School graduate	84 (49.9%)
	University graduate	65 (38.2%)
Occupation	Retired	76 (44.7%)
	Housewife	60 (35.3%)
	Working professional	14 (8.2%)

Dental Caries Status (DMFT Index)

Table 2 presents the DMFT profile of the study population. Participants had a mean of 3.65 ± 3.11 decayed teeth and 6.14 ± 5.17 missing teeth, whereas filled teeth were uncommon (0.52 ± 1.24).

The mean total DMFT score was 10.29 ± 5.86, reflecting substantial cumulative caries experience.

Table 2. Dental Caries Experience Assessed by DMFT Index

Component	Mean Â± SD
Decayed	3.65 Â± 3.11
Missing	6.14 Â± 5.17
Filled	0.52 Â± 1.24
Total DMFT	10.29 Â± 5.86

Periodontal Status (BPE Scores)

Periodontal health assessments (Table 3) showed that one-fifth of patients (20.0%) had a healthy periodontium (Code 0), while 54.7% presented with bleeding or calculus (Codes 1–2). Periodontitis (Codes 3–4) was observed in 25.3% of the sample. The overall mean BPE score was 2.41 ± 0.61.

Table 3. Distribution of Basic Periodontal Examination (BPE) Scores

BPE Code	Interpretation	n (%)
0	Healthy	34 (20.0%)
1-2	Bleeding/Calculus	93 (54.7%)
3-4	Periodontitis	43 (25.3%)
Mean Â± SD		2.41 Â± 0.61

Clinical Oral Health Needs (OHAT Findings)

OHAT findings are summarized in Table 4. Gum and tissue abnormalities were the most frequent concern, affecting 84.10% of participants. Poor oral cleanliness was reported in 79.40%, and dental pain was noted in 45.90%, indicating considerable unmet oral health needs.

Table 4. Oral Health Assessment Tool (OHAT) Findings Among Participants

Domain	% Affected
Gum/tissue changes	84.10%
Poor oral cleanliness	79.40%
Dental pain	45.90%

Oral Health-Related Quality of Life (GOHAI Scores)

GOHAI outcomes (Table 5) revealed mean scores of 12.40 ± 1.75 for physical function, 14.65 ± 2.10 for psychosocial function, and 11.09 ± 1.50 for pain/discomfort. The total mean GOHAI score was 38.14 ± 3.53, reflecting overall compromised OHRQoL in this geriatric population.

Table 5. Geriatric Oral Health Assessment Index (GOHAI) Domain and Total Scores

Domain	Mean Â± SD
Physical function	12.40 Â± 1.75
Psychosocial function	14.65 Â± 2.10
Pain/discomfort	11.09 Â± 1.50
Total GOHAI	38.14 Â± 3.53

Associations Between Clinical Findings and OHRQoL

Significant associations were observed between clinical oral health indicators and OHRQoL measures. Poor oral cleanliness was positively correlated with higher BPE scores ($p = 0.003$, $r = 0.32$). A higher number of missing teeth was associated with increased dental pain ($p = 0.004$, $r = 0.28$). Educational status showed a significant relationship with OHRQoL, with lower education associated with lower GOHAI scores ($p = 0.003$, $\eta^2 = 0.07$).

Discussion

This study provides a comprehensive assessment of the oral health status and oral health-related quality of life of geriatric patients in Lahore and reveals a substantial burden of untreated caries, tooth loss, periodontal disease, and clinical oral health needs. The mean DMFT score of 10.29, largely driven by high numbers of missing teeth, and the predominance of BPE codes indicating bleeding, calculus, and periodontitis reflect longstanding disease patterns consistent with findings from geriatric cohorts in Pakistan and neighboring South Asian regions. These clinical indicators correspond closely with the functional and psychosocial limitations reported by participants, as demonstrated by the moderate mean GOHAI score of 38.14. Taken together, these findings align with previous reports that poor oral health status significantly compromises mastication, comfort, social interaction, and overall quality of life in older adults.

The patterns observed in this study mirror trends reported in research from India and China, where caries, tooth loss, and periodontal disease

remain prevalent among older adults and continue to impose substantial functional limitations. [12, 13] Several factors have been suggested to explain these outcomes in regional studies, including inadequate preventive dental care, low oral-health literacy, high rates of untreated chronic disease, and limited availability of geriatric-focused dental services. Studies from nursing homes and community settings in Iran and China similarly link reduced OHRQoL with tooth loss, periodontal deterioration, and chronic pain, underscoring how cumulative oral disease burdens progressively restrict chewing ability, social interaction, and psychological well-being. [14] The high prevalence of poor oral cleanliness and gum or tissue changes in the present study reflects patterns seen across South Asian and Middle Eastern populations, where neglected oral hygiene practices, compounded by systemic illness, polypharmacy, and restricted access to professional care, accelerate oral health decline in aging individuals. [15] Taken together, these parallels situate the current findings within a broader regional context characterized by persistent gaps in prevention, early intervention, and geriatric-specific oral health infrastructure, highlighting geriatric oral health as a continuing and largely unmet public health need.

The significant associations observed between poor oral cleanliness and higher BPE scores, as well as between missing teeth and increased dental pain, highlight the direct pathways through which clinical disease severity influences OHRQoL. These relationships reflect the well-established bidirectional links between oral and systemic health described in prior work, wherein chronic periodontal inflammation and cumulative tooth loss both constrain oral function and interact with broader physiological and psychosocial well-being. [16] The association between lower education and poorer GOHAI scores further underscores the entrenched role of social determinants in shaping geriatric oral health outcomes. [17] Similar educational and socioeconomic gradients have been documented in international studies, indicating that disparities in health literacy, access to preventive services, and affordability of dental care continue to drive inequalities in OHRQoL. [17]

The combined use of DMFT, BPE, OHAT, and GOHAI in this study enriches the understanding of geriatric oral health by capturing both clinical disease burden and subjective experiences of functional impairment. OHAT findings revealed extensive gum and tissue problems, poor oral cleanliness, and substantial dental pain, underscoring clinical needs that align with GOHAI-reported limitations in physical function, psychosocial well-being, and discomfort. This dual approach responds directly to gaps in the existing Pakistani literature, where prior studies have often relied solely on clinical indices or subjective measures in isolation. [18, 19] The integration of both objective and subjective assessments provides a more holistic depiction of geriatric oral needs and highlights the importance of incorporating patient-reported outcomes into clinical and policy planning.

These findings carry important implications for public health and geriatric dental services. The combination of high DMFT and BPE scores with moderate OHRQoL suggests persistent gaps in preventive care, limited accessibility to dental services, and insufficient integration of gerodontology within routine clinical practice. The disproportionately greater burden among individuals with lower educational attainment points to structural inequities in oral health literacy, affordability of treatment, and continuity of care. As regional and national demographic shifts continue to expand the elderly population, these disparities are likely to intensify if not addressed through targeted interventions. Strengthening community-based oral health promotion, incorporating gerodontology into undergraduate and continuing education curricula, and expanding affordable preventive and restorative services may help mitigate these inequities.

While the study provides valuable insights, several methodological considerations must be acknowledged. The single-center, urban study setting limits the generalizability of findings to rural or underserved populations, where access barriers may be even more pronounced. The cross-sectional design restricts causal inference between clinical indicators and OHRQoL, and the reliance on self-reported measures may introduce recall or reporting bias. Additionally, the absence of multivariable modeling prevents the identification of independent predictors of OHRQoL, although the bivariate associations observed still offer meaningful guidance for service planning and policy development. Future research employing multicenter sampling, longitudinal designs, and multivariate analyses would help clarify causal pathways and refine strategies to improve geriatric oral health outcomes.

Conclusion

This study highlights a substantial burden of dental caries, tooth loss, periodontal disease, and unmet oral health needs among geriatric patients in Lahore, with these clinical conditions contributing to notably reduced oral health-related quality of life. The significant associations between poor oral cleanliness and worse periodontal status, missing teeth and dental pain, and lower education and poorer OHRQoL underscore the combined influence of clinical and social determinants on geriatric oral health. By integrating DMFT, BPE, OHAT, and GOHAI, this study provides a comprehensive overview of both objective disease burden and subjective functional impairment. These findings emphasize the urgent need for strengthened preventive care, improved access to restorative and periodontal services, and targeted gerodontology-focused interventions to enhance oral health and quality of life in Pakistan's rapidly growing elderly population.

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Author Contribution

AA conceived and designed the study. MAK, AN, AK, and NF contributed to data collection. AA and AS performed data analysis and interpretation. MAK, AN, AK, and NF drafted the initial manuscript. SS and AS critically reviewed the manuscript for important intellectual content. All authors approved the final version of the manuscript and agree to be accountable for all aspects of the work.

Data Availability Statement

All relevant data are within the manuscript. Additional data supporting this study are available from the corresponding author upon reasonable request.

Ethical Consideration

This study was conducted in accordance with the Declaration of Helsinki and approved by the University of Lahore Ethics of Research Committee (Approval No. ANDC/IRC/585/07/29). Written informed consent was obtained from all participants prior to data collection.

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Conflict of Interest

None to disclose.

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