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Original Article

Association between Oral Health related Quality of Life and Nutritional Status in Geriatric Patients Reporting to Out Patients Department of Prosthodontics for Prosthetic Rehabilitation

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https://doi.org/10.52206/jsmc.2026.16.2.1519

Abstract

Background: Oral health plays a crucial role in maintaining adequate nutrition, particularly among the geriatric population, where physiological, functional, and socioeconomic factors increase vulnerability to both poor oral health and malnutrition. Impaired oral health-related quality of life (OHRQoL) may significantly influence dietary intake and overall well-being in older adults.

Objective: To assess the association between oral health-related quality of life and nutritional status among geriatric patients presenting to the outpatient department of prosthodontics.

Methodology: This cross-sectional study was conducted over a period of six months (January–June 2024) at Saidu College of Dentistry, Swat, Pakistan. A total of 205 patients aged ≥60 years were enrolled using predefined inclusion criteria. OHRQoL was assessed using the Geriatric Oral Health Assessment Index (GOHAI), while nutritional status was evaluated using the Mini Nutritional Assessment (MNA) tool. Data were analyzed using R software version 4.3.3. Logistic regression analysis was performed to determine associations between variables, with a p-value <0.05 considered statistically significant.

Results: The mean age of participants was 71.8 ± 8.56 years, with 53.17% males. A large proportion (67.8%) exhibited poor OHRQoL. Nutritional assessment revealed that 41.95% were at risk of malnutrition and 36.59% were malnourished. Malnutrition was significantly more prevalent among participants with poor OHRQoL. Multivariable analysis showed that poor OHRQoL was significantly associated with malnutrition (OR 0.61, 95% CI 0.31–0.99; p = 0.035). Age ≤70 years was independently associated with reduced odds of malnutrition (OR 0.51, 95% CI 0.28–0.91; p = 0.03).

Conclusion: Poor oral health-related quality of life is strongly associated with compromised nutritional status among geriatric patients. These findings highlight the need for integrated oral health and nutritional interventions to improve overall health outcomes in the elderly population.

Keywords: Geriatrics, GOHAI, Mini Nutritional Assessment, Nutritional Status, OHRQoL.

ISSN (P): 1819-4583
ISSN (E): 3007-9470

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Citation:
Turk MH, Abdullah, Saeed A, Khan S, Jehan NS, Khan IU. Association between Oral Health related Quality of Life and Nutritional Status in Geriatric Patients Reporting to Out Patients Department of Prosthodontics for Prosthetic Rehabilitation. *J Saidu Med Coll.* 2026;16(2):319–326.

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Funding:
The authors received no external funding for this study.

Conflicts of Interests:
The authors have declared that no competing interests exist.

Data Sharing Statement:
The data that support the findings of this study are available on request from the corresponding author. The data is not publicly available due to privacy or ethical restrictions.

Received: January 28, 2026
1st Revision: February 10, 2026
2nd Revision: March 12, 2026
Accepted: March 13, 2026

Introduction

Good nutrition is a fundamental determinant of health and quality of life, particularly in the geriatric population, where age-related physiological changes, chronic illnesses, and functional limitations increase susceptibility to malnutrition [1]. Globally, the proportion of older adults is rapidly increasing, and in Pakistan, it is projected that approximately 9.3% of the population will be aged over 60 years by 2030, highlighting the growing importance of geriatric healthcare [1]. Among the various determinants of health in older adults, nutritional status plays a critical role in influencing morbidity, functional independence, and overall well-being [2].

Malnutrition in the elderly is a multifactorial condition influenced by biological, psychological, and social factors. One of the most significant yet often overlooked contributors is oral health. Poor oral health conditions, including tooth loss, periodontal disease, and reduced masticatory efficiency, can impair the ability to chew and process food effectively, thereby limiting dietary intake and nutrient absorption [3,4]. Edentulism and partial tooth loss have been strongly associated with reduced consumption of nutrient-rich foods, particularly fruits, vegetables, and protein sources, ultimately increasing the risk of undernutrition [3,5].

The oral cavity serves as the entry point to the digestive system, and any compromise in oral health can adversely affect dietary habits and nutritional outcomes. In this context, oral health-related quality of life (OHRQoL) has emerged as an important multidimensional construct that reflects the functional, psychological, and social impacts of oral health conditions [6,7]. Unlike traditional clinical indicators, OHRQoL provides a patient-centered perspective, capturing how oral health affects daily activities, social interactions, and overall life satisfaction [3,8].

The Geriatric Oral Health Assessment Index (GOHAI) is a widely used and validated tool for assessing OHRQoL in older adults. It encompasses domains such as pain, functional limitation, and psychosocial impact, offering a comprehensive evaluation of oral health from the patient's perspective [3,8]. Similarly, the Mini Nutritional Assessment (MNA) is a validated and reliable tool for identifying malnutrition and its risk among the elderly, enabling early detection and intervention [9].

Several studies have reported a significant association between oral health and nutritional status in older populations, suggesting that poor oral health may lead to dietary restrictions, reduced food intake, and subsequent malnutrition [10,11]. Furthermore, in resource-limited settings such as Pakistan, restricted access to dental care, lack of awareness, and socioeconomic disparities further exacerbate the burden of poor oral health and its consequences [5,6].

Despite the growing recognition of this association, there remains limited evidence from developing countries exploring the relationship between OHRQoL and nutritional status among geriatric patients. Therefore, this study aimed to assess the relationship between oral health-related quality of life and nutritional status among elderly patients presenting to a tertiary care dental facility in Swat, Pakistan, and to identify associated demographic and socioeconomic factors influencing these outcomes.

Methodology

Study Design

This study employed a cross-sectional analytical design to investigate the relationship between oral health-related quality of life (OHRQoL) and nutritional status among geriatric patients. The cross-sectional nature of the study enabled the simultaneous assessment of exposure (OHRQoL) and outcome (nutritional status) within a defined population over a specified time period, facilitating the identification of associations between key variables.

Ethics

Ethical approval for the study was obtained from the Ethical Review Board of Saidu Medical College, Swat, Pakistan (Reference No. 83-ERB/023, dated 09-08-2023). All procedures were conducted in accordance with established ethical standards for human research. Written informed consent was obtained from all participants prior to enrollment, ensuring confidentiality, voluntary participation, and the right to withdraw at any stage without any consequences.

Setting

The study was conducted in the Department of Prosthodontics at Saidu College of Dentistry, Swat, Pakistan. This setting provided access to a diverse population of geriatric patients presenting for prosthodontic care, thereby enabling the evaluation of oral health conditions and nutritional status within a clinical outpatient environment. The study duration was six months, from January 2024 to June 2024.

Participants

A total of 205 participants were enrolled in the study using predefined inclusion and exclusion criteria. Eligible participants included individuals aged 60 years and above, of either gender, who had at least five missing teeth in both upper and lower arches and required prosthetic rehabilitation. Patients who were bedridden, had severe psychiatric disorders, hearing impairments, or were unwilling to participate were excluded. Recruitment was conducted after obtaining informed consent, ensuring that participants met all eligibility criteria.

Variables

The primary outcome variable was nutritional status, while the main exposure variable was oral health-related quality of life (OHRQoL). Additional covariates included demographic and socioeconomic characteristics such as age, gender, education level, monthly income, and residential status (urban/rural). These variables were selected based on their potential influence on both oral health and nutritional outcomes.

Data Sources/Measurement

Data were collected through structured interviews and clinical oral examinations using a pre-designed proforma. OHRQoL was assessed using the validated Geriatric Oral Health Assessment Index (GOHAI), which consists of 12 items scored on a five-point Likert scale (1 = never to 5 = always), with a total score range of 12–60. Scores between 12–56 indicated poor OHRQoL, while scores >57 indicated good OHRQoL (2, 10, 11). Nutritional status was evaluated using the Mini Nutritional Assessment (MNA), which includes 18 indicators with a total score of 30; scores of 24–30 indicated normal nutritional status, 17–23.5 indicated risk of malnutrition, and <17 indicated malnutrition.

Bias

Efforts were made to minimize potential sources of bias. Selection bias was reduced by applying strict inclusion and exclusion criteria. Information bias was minimized through the use of validated assessment tools (GOHAI and MNA) and standardized data collection procedures. However, as the study relied partly on self-reported responses, recall bias could not be completely eliminated. Additionally, the single-center design may limit generalizability and introduce sampling bias.

Study Size

The sample size of 205 participants was calculated using the World Health Organization (WHO) sample size calculator, assuming a 95% confidence interval, 6% margin of error, and an estimated prevalence of 25.8% for high perception GOHAI scores. This ensured adequate statistical power to detect meaningful associations between OHRQoL and nutritional status.

Quantitative Variables

Continuous variables such as age and monthly income were treated as quantitative variables and summarized using mean and standard deviation (SD). Categorical variables, including gender, education level, residence, OHRQoL categories, and nutritional status categories, were analyzed as discrete variables and presented as frequencies and percentages.

Statistical Methods

Data were entered and analyzed using R software version 4.3.3. Descriptive statistics were computed for all variables. Continuous variables were expressed as mean ± SD, while categorical variables were reported as frequencies and percentages. Binary logistic regression analysis was performed to evaluate the association between independent variables (demographic and socioeconomic factors, OHRQoL) and the dependent outcome (nutritional status). Both univariable and multivariable analyses were conducted to adjust for potential confounders. All statistical tests were two-tailed, and a p-value of <0.05 was considered statistically significant.

Results

Participants

A total of 205 geriatric patients were included in the final analysis. All participants met the predefined inclusion criteria and completed the required assessments. The study achieved full data completeness with no reported missing values, ensuring robustness of the analysis. The demographic and baseline characteristics of the participants are summarized in Table 1.

Descriptive Data

The mean age of the participants was 71.8 ± 8.56 years, with a slight male predominance (53.17%). The majority of participants had attained matric-level education (40%), followed by higher education (25.37%), while a considerable proportion were illiterate (20.49%). Most participants were residents of rural areas (55.61%), and the mean monthly income was PKR 50,400 ± 40,322.67, with approximately two-thirds (68.78%) earning ≤ PKR 50,000. In terms of oral health-related quality of life, a substantial proportion of participants (67.8%) were classified as having poor OHRQoL, while only 32.2% reported good OHRQoL. Regarding nutritional status, 41.95% of participants were at risk of malnutrition, 36.59% were malnourished, and only

21.46% had normal nutritional status. These findings highlight a high burden of both poor oral health and compromised nutritional status among the study population (Table 1).

Outcome Data

The association between OHRQoL and nutritional status revealed that malnutrition was more prevalent among participants with poor OHRQoL. Conversely, individuals with good OHRQoL were more likely to have normal nutritional status. Logistic regression analysis demonstrated that participants with poor OHRQoL had reduced odds of malnutrition compared to those with good OHRQoL (multivariable OR 0.61, 95% CI 0.31–0.99; p = 0.035), indicating a statistically significant relationship (Table 2).

Further analysis showed that age was a significant determinant of nutritional status, with participants aged ≤70 years having significantly lower odds of malnutrition compared to those older than 70 years (OR 0.51, 95% CI 0.28–0.91; p = 0.03). Other variables, including gender, education level, income, and residence, did not show statistically significant associations with nutritional status in the adjusted model (Table 2).

In relation to OHRQoL, multivariable analysis indicated that demographic factors such as age, gender, and education level were not significantly associated with oral health-related quality of life (p > 0.05). However, residence showed a borderline association, with individuals living in urban areas having higher odds of poor OHRQoL (OR 2.1, 95% CI 0.9–4.5; p = 0.05). Importantly, nutritional status demonstrated a strong and statistically significant association with OHRQoL, where participants at risk of malnutrition or malnourished had markedly lower odds of good OHRQoL (p < 0.001) (Table 3).

Main Results

The findings of this study demonstrate a significant association between oral health-related quality of life and nutritional status among geriatric patients. Poor OHRQoL was highly prevalent and closely linked with increased risk of malnutrition. Age emerged as an independent predictor, with younger elderly individuals (≤70 years) showing a protective effect against malnutrition. Although socioeconomic variables such as education, income, and residence were not statistically significant predictors in multivariable models, trends suggest their potential influence on both oral health and nutritional outcomes. These results collectively emphasize the interrelationship between oral health and nutrition and underscore the importance of integrated clinical and public health interventions targeting both domains (Tables 1–3).

Table 1. Demographics of study participants

Variable	Statistics	N = 205* (%)
Age	Mean (SD)	71.8 (8.56)
Gender	female	96 (46.83)
	male	109 (53.17)
Education	higher	52 (25.37)
	illiterate	42 (20.49)
	matric	82 (40)
	primary	29 (14.15)
Income	Mean (SD)	50400 (40322.67)
Residence	rural	114 (55.61)
	urban	91 (44.39)
OHRQoL	Good	66 (32.2)
	poor	139 (67.8)
Malnutrition	At risk of malnutrition	86 (41.95)
	Malnourished	75 (36.59)
	Normal	44 (21.46)
Income group	above 50000 pKR	64 (31.22)
	upto 50000 pKR	141 (68.78)
Age group	> 70 years	97 (47.32)
	≤ 70 years	108 (52.68)

* Mean (SD)/n(%)

Table 2: Univariable and multivariable logistic regression analysis of factors associated with the nutritional status

Predictor		Univariable OR (95% CI)	Univariable p value	Multivariable OR (95% CI)	Multivariable p value
OHRQoL	Good	Reference	—	Reference	—
	Poor	0.59 (0.31–1.89)	0.03	0.61 (0.31–0.99)	0.035
Gender	Female	Reference	—	Reference	—
	Male	1.46 (0.84–2.56)	0.18	1.32 (0.74–2.37)	0.35
Education	Higher	Reference	—	Reference	—
	Illiterate	0.58 (0.25–1.31)	0.19	0.83 (0.33–2.11)	0.69
	Matric	0.81 (0.39–1.65)	0.57	1.01 (0.46–2.24)	0.98
	Primary	0.82 (0.32–2.09)	0.67	1.02 (0.36–2.90)	0.98
Income	> PKR 50,000	Reference	—	Reference	—
	≤ PKR 50,000	0.63 (0.34–1.15)	0.14	0.62 (0.30–1.26)	0.19
Age group	> 70 years	Reference	—	Reference	—
	≤ 70 years	0.56 (0.32–0.99)	0.05	0.51 (0.28–0.91)	0.03
Residence	Rural	Reference	—	Reference	—
	Urban	0.86 (0.49–1.51)	0.60	0.67 (0.36–1.24)	0.21

Binary logistic regression

Table 3. Univariable and multivariable logistic regression analysis of factors associated with the OHRQoL

Variable	Subcategory	Univariable OR (95% CI)	Univariable p value	Multivariable OR (95% CI)	Multivariable p value
Age	<70 years	-	-	-	-
	>70 years	0.69(0.38-1.25)	0.22	0.7(0.3-1.6)	0.4
Gender	Male	-	-	-	-
	Female	0.58(0.32-1.06)	0.07	1.0(0.4-2.2)	0.87
Education status	Graduation	-	-	-	-
	Intermediate	0.1(0.04-0.39)	<0.001	0.4(0.09-1.7)	0.2
	Secondary	0.1(0.05-0.6)	0.005	0.5(0.1-2.5)	0.4
	Primary	0.1 (0.04-0.3)	<0.001	0.3(0.08-1.1)	0.07
	Illiterate	0.3 (0.09-0.9)	0.04	0.7(0.1-3.1)	0.7
Residence	Rural	-	-	-	-
	Urban	2.9(1.5-5.3)	0.001	2.1(0.9-4.5)	0.05
Income per month	<50000	-	-	-	-
	>50000	3.4(1.8-6.5)	<0.001	1.3(0.5-3.1)	0.5
Nutritional status	Normal	-	-	-	-
	At risk	0.08(0.03-0.2)	<0.001	0.1(0.04-0.2)	<0.001
	Malnourished	0.03(0.01-0.09)	<0.001	0.05(0.01-0.1)	<0.001

Binary logistic regression

Discussion

This cross-sectional study explored the association between oral health-related quality of life (OHRQoL) and nutritional status among geriatric patients, revealing a substantial burden of both poor oral health and malnutrition in the study population. A considerable proportion of participants (67.8%) demonstrated poor OHRQoL, reflecting significant oral health challenges among elderly individuals. These findings are consistent with previous studies conducted in developing countries, where limited access to dental care and poor oral hygiene practices contribute to compromised oral health outcomes [12].

The prevalence of malnutrition and risk of malnutrition observed in this study (approximately 78% combined) highlights a critical public health concern. Similar findings have been reported in resource-limited settings, where elderly populations are particularly vulnerable due to socioeconomic constraints, reduced functional capacity, and limited healthcare access [13]. The coexistence of poor OHRQoL and compromised nutritional status underscores the interdependent relationship between oral health and overall health in aging populations.

A key finding of this study was the statistically significant association between OHRQoL and nutritional status, where poor oral health was strongly linked to increased risk of malnutrition ($p < 0.001$). This aligns with findings from Banerjee et al., who demonstrated that impaired oral health restricts the consumption of nutrient-dense foods due to chewing difficulties, pain, and discomfort, ultimately leading to inadequate nutritional intake [14]. Furthermore, individuals with poor oral health often avoid fibrous and protein-rich foods that require extensive mastication, thereby increasing the risk of nutritional deficiencies [15]. These findings reinforce the biological plausibility that oral dysfunction directly impacts dietary patterns and nutritional outcomes.

Although higher education and income levels were associated with better oral health and nutritional outcomes, these associations were not statistically significant in the present study. Previous literature suggests that higher educational attainment is linked to improved health literacy, preventive behaviors, and healthcare utilization, which can positively influence both oral health and nutrition [16]. The lack of statistical significance in our findings may be attributed to sample characteristics or underlying socioeconomic homogeneity within the study population.

Residence emerged as an important contextual factor, with urban participants showing a trend toward poorer OHRQoL compared to rural counterparts, although this association was borderline significant ($p = 0.05$). This finding contrasts with some studies reporting better oral health outcomes in urban populations due to improved access to healthcare services [17]. However, it may reflect lifestyle factors, dietary habits, or disparities in healthcare utilization within urban settings in the local context.

Income also demonstrated a trend toward improved outcomes among individuals earning more than PKR 50,000, although the association was not statistically significant. This observation is supported by previous research indicating that financial stability enables better access to dental care, nutritious food, and preventive health services [18]. Similarly, gender did not show a significant association with either OHRQoL or nutritional status, although some studies have reported gender-based disparities influenced by sociocultural factors and healthcare access [19].

Age was identified as an independent predictor of nutritional status, with participants aged ≤70 years having significantly lower odds of malnutrition. This finding is consistent with existing literature, which indicates that advancing age is associated with increased frailty, comorbidities, and functional decline, all of which contribute to poor nutritional outcomes [20].

The findings of this study emphasize the strong interrelationship between oral health and nutritional status in geriatric populations. The results highlight the need for integrated healthcare approaches that address both oral and nutritional health simultaneously. Screening programs that incorporate both OHRQoL and nutritional assessment tools could facilitate early identification of at-risk individuals. Furthermore, prosthodontic rehabilitation should be considered an essential component of comprehensive geriatric care, as it may improve chewing efficiency, dietary intake, and overall quality of life [20].

Limitations

This study has several limitations that should be considered when interpreting the findings. First, the study was conducted at a single center, which may limit the generalizability of the results to other regions with different socioeconomic, cultural, and healthcare contexts. Second, the cross-sectional design restricts the ability to establish causal relationships between oral health-related quality of life and nutritional status.

Additionally, certain potentially influential variables, such as detailed dietary intake, comorbid medical conditions, and medication use, were not assessed, which may have confounded the observed associations. The exclusion of patients with severe comorbidities and polypharmacy may also limit the applicability of the findings to the broader geriatric population. Furthermore, reliance on self-reported data for some measures may introduce recall or reporting bias.

Conclusion

Malnutrition was highly prevalent among the geriatric population studied, particularly among individuals with poor oral health-related quality of life. A significant association was observed between OHRQoL and nutritional status, emphasizing the critical role of oral health in maintaining adequate nutrition among older adults. Age emerged as an independent predictor, with younger elderly individuals demonstrating a lower risk of malnutrition.

Although socioeconomic factors such as education, income, and residence were not statistically significant predictors, observed trends suggest their potential influence on health outcomes. These findings underscore the importance of adopting integrated, multidisciplinary approaches that combine oral healthcare and nutritional support in geriatric populations. Targeted screening, early intervention, and improved access to dental and nutritional services are essential to enhance health outcomes and quality of life among the elderly.

Authors' Contributions:

All authors meet the ICMJE criteria for authorship.

Author 1: Substantial contribution to conception and design, drafting the manuscript, final approval, agreed to be accountable for all the work.
Author 2: Substantial contribution to conception and design, data acquisition, drafting the manuscript, final approval, agreed to be accountable for all the work.
Author 3: Analysis and interpretation of data, drafting the manuscript, final approval, agreed to be accountable for all the work.
Author 4: Analysis and interpretation of data, critical revision, final approval, agreed to be accountable for all the work.
Author 5: Substantial contribution to conception and design, drafting the manuscript, final approval, agreed to be accountable for all the work.
Author 6: Substantial contribution to conception and design, data acquisition, drafting the manuscript, final approval, agreed to be accountable for all the work.

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