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ASSESSMENT OF ORAL HEALTH LITERACY, KNOWLEDGE AND BEHAVIOUR AMONG PATIENTS WITH PERIODONTAL DISEASE

Original Research

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ABSTRACT

Background: Periodontal disease is one of the most prevalent chronic inflammatory conditions globally and a major cause of tooth loss. Its impact extends beyond oral health, contributing to systemic complications and reduced quality of life. In resource-limited settings, low oral health literacy, misconceptions about disease symptoms, and poor hygiene practices often exacerbate the burden of periodontal disease. Understanding the relationship between literacy, knowledge, behavior, and clinical outcomes is crucial for designing effective interventions.

Objective: To evaluate oral health literacy, knowledge, behavior, and clinical periodontal status among patients in Peshawar, Pakistan.

Methods: A descriptive cross-sectional study was conducted over six months in selected periodontology wards, including Sardar Begum Dental College. A total of 272 adults aged 16–85 years with at least 20 natural teeth were recruited through non-probability sampling. Data were collected using a structured, researcher-administered questionnaire covering demographics, oral health literacy, knowledge, and behavior. Clinical periodontal assessment was performed by calibrated dental examiners using the 2018 American Academy of Periodontology guidelines. Data were analyzed with SPSS version 25, applying descriptive statistics to summarize variables.

Results: Of the participants, 54.4% were male and 45.6% female, with a mean age of 34.9 ± 14.85 years. Primary education was the highest qualification for 51.5% of respondents. Oral health literacy was limited: only 31.6% always understood dentists' instructions, while 25.0% had never visited a dentist. Knowledge showed variation, with 86.4% recognizing plaque as a cause of gum disease but 45.6% believing bleeding gums were normal. Oral hygiene behaviors were poor; 47.8% brushed once daily, 30.1% twice daily, and 22.1% less than weekly. Flossing was neglected by 80.1%, while 23.5% smoked. Clinically, 87.9% exhibited periodontitis, including mild (36.0%), moderate (27.2%), and severe (24.6%) cases.

Conclusion: Limited oral health literacy, misconceptions about early symptoms, and poor hygiene practices were strongly associated with the high prevalence of periodontitis in this population. Targeted educational and behavioral interventions are urgently required to improve literacy, promote preventive practices, and reduce disease burden.

Keywords: Behavior, Knowledge, Oral Health Literacy, Periodontal Diseases, Periodontitis, Pakistan, Smoking.

INTRODUCTION

Periodontal disease is among the most widespread chronic inflammatory conditions worldwide, affecting the supporting structures of the teeth and remaining a leading cause of tooth loss (1). Severe periodontitis has been reported to affect approximately 11% of adults, while moderate-to-severe forms impact more than 45% of the global population, making it the sixth most prevalent health condition (2). Importantly, its significance extends beyond oral health, as mounting evidence has linked periodontal disease to systemic conditions including diabetes mellitus, cardiovascular disease, and adverse pregnancy outcomes, thereby underscoring its relevance as a pressing public health concern (3,4). The burden of periodontal disease is multifaceted, encompassing not only biological consequences but also socioeconomic impacts. Individuals with advanced disease frequently suffer from pain, impaired mastication, halitosis, and compromised esthetics, which contribute to diminished quality of life and psychosocial distress (5). At the same time, treatment of advanced periodontitis imposes considerable financial costs, particularly in resource-limited settings where preventive services are underutilized and inequities in oral healthcare access remain pronounced (6).

Oral health literacy (OHL) has emerged as a key determinant of oral health outcomes, enabling individuals to comprehend professional advice, recognize early signs of disease, and adopt preventive practices (7). Conversely, limited literacy has been consistently associated with delayed health-seeking behaviors, misconceptions about common symptoms such as gingival bleeding, and poorer adherence to treatment regimens (8). Alongside literacy, oral health knowledge and behaviors, including regular toothbrushing, interdental cleaning, and use of preventive aids, are crucial to maintaining periodontal health. However, such practices remain suboptimal in many low- and middle-income countries where structural barriers and behavioral risk factors, including tobacco use, remain prevalent (9-11). Despite the well-established association between OHL, knowledge, and preventive behaviors, significant gaps remain in understanding how these factors collectively influence clinical periodontal outcomes in populations with limited access to care. Identifying these interrelationships is essential for designing effective, culturally appropriate, and context-sensitive interventions that can reduce the burden of periodontal disease and promote equity in oral health. Therefore, the present study was undertaken to assess oral health literacy, knowledge, behaviors, and the clinical periodontal status of the study population, with the objective of identifying gaps that may inform the development of targeted preventive and educational strategies.

METHODS

The present study adopted a descriptive cross-sectional design and was conducted in Peshawar, Pakistan, within the periodontology wards of selected hospitals, including Sardar Begum Dental College, over a six-month period between August and February 2024. A total of 272 participants were recruited using a non-probability sampling approach. Eligibility criteria required participants to be adults between the ages of 16 and 85 years, possessing at least 20 natural teeth, and willing to provide informed consent. Individuals with uncontrolled diabetes, HIV infection, severe systemic illnesses, or those who were pregnant were excluded in order to minimize potential confounding influences on periodontal health. Ethical approval for the study was secured from the Khyber Medical University Ethical Review Committee as well as the Institutional Review Board of Sardar Begum Dental College and Hayatabad Medical Complex. Written informed consent was obtained from each participant prior to enrollment, and all procedures were conducted in accordance with the ethical standards of the Helsinki Declaration.

Data collection was performed using a researcher-administered, self-designed, closed-ended questionnaire in English. The instrument consisted of 19 items divided across five sections, which assessed sociodemographic characteristics, oral health literacy, oral health knowledge, and self-reported oral health behaviors. Clinical examinations were carried out by two calibrated dental examiners using a standard periodontal probe to ensure diagnostic consistency. Periodontal status was categorized as mild, moderate, or severe in accordance with the 2018 American Academy of Periodontology classification system, based on probing depth, clinical attachment loss, and bleeding on probing. Data analysis was conducted using SPSS version 25.0. Descriptive statistics, including means and standard deviations for continuous variables and frequencies with percentages for categorical variables, were calculated to summarize participant characteristics, oral health literacy, knowledge, behaviors, and periodontal status. Results were displayed using tables and graphs for clarity and ease of interpretation.

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RESULTS

A total of 272 participants were included in the study, with a slightly higher proportion of males (54.4%) compared to females (45.6%). The mean age of the study group was 34.9 years (SD = 14.85), ranging between 15 and 78 years. Educational attainment varied, with 51.5% reporting primary education, 32.0% secondary education, 12.9% undergraduate qualifications, and only 3.7% postgraduate education. Clinical assessment of periodontal health showed that mild periodontitis was the most frequent diagnosis, affecting 36.0% of participants, followed by moderate disease in 27.2% and severe disease in 24.6%. A further 12.1% were categorized as not applicable, either indicating the absence of periodontitis or not fitting the diagnostic criteria. Assessment of oral health literacy revealed that 46.0% of participants had visited a dentist within the last year, whereas 20.2% had not visited for more than two years and 25.0% had never visited at all. Understanding of dentists' instructions varied, with only 31.6% consistently understanding the information provided, 31.3% partially understanding, 23.5% admitting confusion, and 13.6% reporting complete lack of understanding. Oral health knowledge was mixed. While 86.4% of respondents correctly identified plaque as the cause of gum disease, 45.6% incorrectly believed that gum bleeding during brushing or flossing was normal. Additionally, 78.3% associated persistent halitosis with gum disease, and 78.3% correctly recognized that pus between gums and teeth is abnormal. A high proportion (96.7%) understood that periodontal disease can lead to tooth mobility and eventual tooth loss.

Oral health behaviors were suboptimal. Nearly half of participants (47.8%) brushed their teeth once daily, while 30.1% brushed twice a day, and 22.1% brushed less than once per week. Flossing habits were particularly poor, with 80.1% never flossing and only 3.3% reporting daily flossing. Preventive practices were also limited, as 83.1% used toothpaste regularly but only 22.1% reported using antibacterial mouthwash. Furthermore, 23.5% of participants reported being smokers, a known modifiable risk factor for periodontal disease. When the relationship between periodontal severity and oral hygiene behavior was examined, clear associations were observed. Participants who reported brushing less than once per week had a higher proportion of severe periodontitis compared to those who brushed once or twice daily. Among individuals with severe disease, 20 participants reported brushing less than once per week, while only 17 reported brushing twice daily. Conversely, those with mild disease were more commonly associated with daily brushing habits, as 45 brushed once per day and 33 brushed twice daily. These trends indicate that inadequate oral hygiene behaviors were strongly associated with worsening periodontal outcomes. Similar patterns were noted with other behavioral and literacy measures, where participants with infrequent dental visits and poor understanding of dentists' instructions were more frequently represented in the moderate and severe categories. Smokers also demonstrated a disproportionate burden of severe disease compared to non-smokers, supporting the role of behavioral and literacy gaps as determinants of periodontal health.

Table 1: Demographic Characteristics of the Participants

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	148	54.4
	Female	124	45.6
Age (years)	Mean ± SD	34.91 ± 14.85	–
	Median (Range)	30 (15–78)	–
Educational Status	Primary	140	51.5
	Secondary	87	32.0
	Undergraduate	35	12.9
	Postgraduate	10	3.7

Table 2: Periodontal Status

Variable	Category	Frequency (n)	Percentage (%)
Type of periodontitis	Mild	98	36.0
	Moderate	74	27.2
	Severe	67	24.6
	Not applicable	33	12.1
	Total	272	100

Table 3: Oral Health Literacy

Variable	Category	Frequency (n)	Percentage (%)
Frequency of dental visit	More than 2 years	55	20.2
	1–2 years ago	24	8.8
	Less than 1 year	125	46.0
	Never visited	68	25.0
Understanding dentist's instructions	Always	86	31.6
	Partial understanding	85	31.3
	Confused	64	23.5
	Never understand	37	13.6
	Total	272	100

Table 4: Oral Health Knowledge Variables

Variable	Category	Frequency (n)	Percentage (%)
Bleeding of gums while brushing/flossing	Yes	124	45.6
	No	148	54.4
Plaque causes gum disease	Yes	235	86.4
	No	37	13.6
Persistent bad breath indicates gum disease	Yes	213	78.3
	No	59	21.7
Pus between gums and teeth common in healthy gums?	Yes	59	21.7
	No	213	78.3
Teeth loosen due to gum disease	Yes	263	96.7
	No	9	3.3
	Total	272	100

Table 5: Oral Health Behaviour

Variable	Category	Frequency (n)	Percentage (%)
Frequency of Brushing	Less than once a week	60	22.1
	Once a day	130	47.8
	Twice a day	82	30.1
Frequency of flossing	Less than once a week	22	8.1
	Once a day	9	3.3
	Hardly ever	23	8.5
	Never	218	80.1
Use of antibacterial mouthwash	Yes	60	22.1
	No	212	77.9
Use of toothpaste	Yes	226	83.1
	No	46	16.9
Smoking habits	Yes	64	23.5
	No	208	76.5

Table 6: Cross-tabulation: Periodontal Status vs Brushing Frequency

Periodontal Status	Less than once a week (n)	Once a day (n)	Twice a day (n)	Total (n)
Mild	20	45	33	98
Moderate	15	40	19	74
Severe	20	30	17	67
Not applicable	5	15	13	33
Total	60	130	82	272

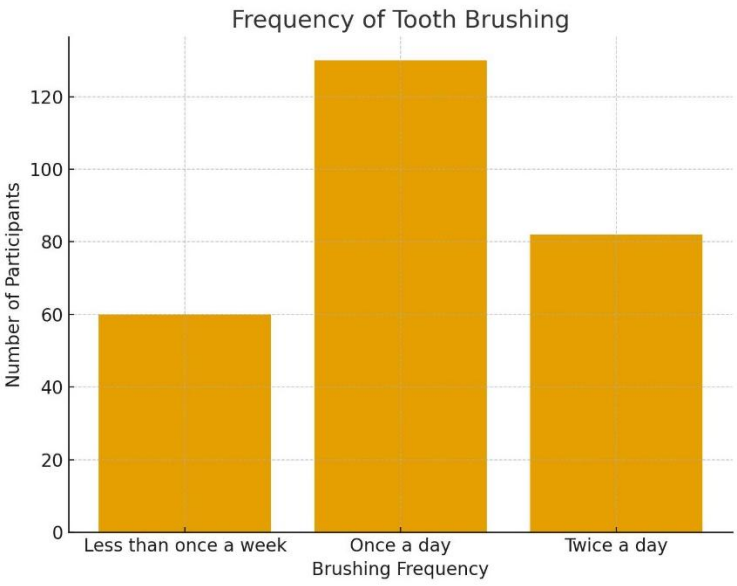

Figure 2 Frequency of Tooth Brushing

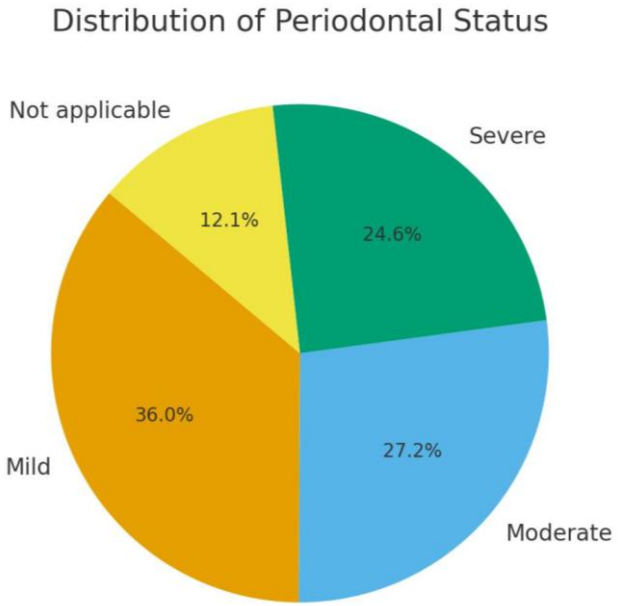

Figure 2 Distribution of Periodontal Status

DISCUSSION

The present study explored the complex relationship between oral health literacy, knowledge, behaviors, and clinical periodontal status, revealing a considerable mismatch between awareness and actual practices. The findings highlighted a high burden of periodontal disease in the study population, reflecting both individual-level and systemic challenges that are consistent with trends reported in other low- and middle-income countries. Oral health literacy emerged as a significant determinant of periodontal health. Less than half of the participants had visited a dentist in the past year, and one-quarter had never sought dental care, mirroring evidence from other developing regions where service utilization remains low due to financial, cultural, and structural barriers (12,13). More concerning was the finding that a majority of participants reported partial or limited understanding of dentists' instructions, which can impair adherence to preventive recommendations and therapeutic regimens. Similar studies have emphasized that limited literacy not only delays care-seeking but also compounds disease progression, ultimately contributing to poorer outcomes (14). This highlights the need for patient-centered communication strategies that are accessible and culturally appropriate. Knowledge of periodontal disease showed both encouraging and concerning patterns. Almost all respondents were aware that gum disease could lead to tooth mobility and tooth loss, indicating recognition of its advanced consequences. However, nearly half of the participants regarded bleeding gums during brushing as a normal phenomenon, a misconception reported in other South Asian and Middle Eastern populations as well (15,16). Such gaps demonstrate that awareness of advanced disease manifestations may coexist with poor recognition of early warning signs, thereby delaying intervention at a stage when disease is more easily reversible. Misconceptions of this nature highlight an urgent need for targeted health education emphasizing early symptoms rather than only end-stage outcomes.

Oral health behaviors were found to be suboptimal, with fewer than one-third of participants brushing twice daily in line with global recommendations, and flossing was almost universally neglected. These findings parallel international reports indicating that interdental cleaning is underutilized, even in populations with higher health literacy (17,18). Smoking prevalence in the study was 23.5%, aligning with its well-established role as a modifiable risk factor that significantly worsens periodontal prognosis and treatment outcomes (19). The combination of poor hygiene practices and high-risk behaviors likely contributed to the severe periodontal burden observed in this population. The clinical assessment revealed that nearly 88% of the participants had some form of periodontitis, with one-fourth classified as severe. This prevalence is strikingly higher than the global estimates suggesting that moderate-to-severe periodontitis affects around 45% of adults worldwide (20,21). Similar findings have been reported from other resource-limited regions where preventive

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care is inadequate and misconceptions about oral health are widespread (22). The disproportionate prevalence of severe disease in the present study underlines the pressing need for public health interventions aimed at prevention and early detection.

The strengths of this study lie in its comprehensive evaluation of literacy, knowledge, behavior, and clinical outcomes within the same population, allowing for a multidimensional understanding of disease determinants. The use of standardized periodontal classification enhanced diagnostic reliability. However, limitations must be acknowledged. The non-probability sampling method may reduce generalizability, and the reliance on a self-designed questionnaire without validated psychometric testing could affect the accuracy of literacy and knowledge assessments. Furthermore, while descriptive findings were robust, the absence of inferential statistical analysis limited the ability to quantify associations between variables. Future research should apply regression models or other inferential techniques to establish causal pathways and identify independent predictors of disease severity. The implications of these findings are significant. Improving oral health literacy through targeted education and culturally adapted communication could help reduce misconceptions and encourage timely care-seeking. Strengthening preventive behaviors, including twice-daily brushing, interdental cleaning, and smoking cessation, should form the cornerstone of public health programs. Policy-level strategies should also integrate oral health into broader health literacy campaigns to reduce disparities. Future studies should expand to larger, more representative samples and incorporate longitudinal designs to better assess the causal role of literacy and behaviors in periodontal disease progression. In conclusion, the study underscores the urgent need for integrated educational, behavioral, and systemic interventions to address the high burden of periodontal disease in this population. The combination of poor oral health literacy, misconceptions about disease, suboptimal behaviors, and high prevalence of risk factors collectively contribute to the severity of outcomes, demanding targeted strategies at both clinical and public health levels.

CONCLUSION

This study concludes that oral health literacy among individuals with periodontal disease in Peshawar remains limited, with persistent misconceptions about early signs of disease despite reasonable awareness of its advanced consequences. Inadequate oral hygiene practices, poor utilization of preventive measures, and the prevalence of high-risk habits such as smoking were found to contribute to the progression of periodontal disease. The consistently high burden of moderate to severe disease highlights the urgent need for targeted educational initiatives, promotion of healthier behaviors, and the integration of oral health literacy into broader public health strategies. These measures are essential for improving early detection, enhancing treatment adherence, and ultimately reducing the impact of periodontal disease on individual and community health.

AUTHOR CONTRIBUTION

Author	Contribution
Sadaf Rahman	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Alia Abduraqeeb	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Shams Ur Rahman	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Wania Aiman	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Muhammad Faisal Khan*	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published

REFERENCES

1. Zholdassova N, Yermukhanova L, Umbetov M, Saparbayev S, Sadykova G. Assessment of hygienic knowledge and oral health practices among children under dynamic observation for periodontosis in Aktobe. J Prev Med Hyg. 2025;66(1):E110-e3.

2. Darestani MN, Akbari A, Yaghobee S, Taheri M, Akbari S. COVID-19 Pandemic and Periodontal Practice: The Immunological, Clinical, and Economic Points of View. Biomed Res Int. 2022;2022:3918980.

3. Yang A, Yuan W, Yang L, Lei L, Cao Z, Chen L. Dental Hygienists' Influence on Oral Health Knowledge, Attitudes and Behavioural of Patients and Effectiveness on Improving Patients' Periodontal Status-Evaluations of a Hospital Based Oral Hygiene Training Program in China. Int J Dent Hyg. 2025;23(2):277-85.

4. Haresaku S, Chishaki A, Hatakeyama J, Yoshinaga Y, Yoshizumi J, Yamamoto M, et al. Development of a School-Based Online Periodontal Education Programme for Adolescents. Int Dent J. 2025;75(2):502-13.

5. Lei B, Xue W, Zhao S, Zhang L, Andegiorgish AK, Liu J, et al. Effects of Systematic Oral Hygiene Guidance on Plaque Control Among Periodontal Patients. Int J Dent Hyg. 2025;23(3):547-58.

6. Chakraborty T, Kaper MS, Almansa J, Schuller AA, Reijneveld SA. Health literacy, oral diseases, and contributing pathways: results from the Lifelines Cohort Study. J Dent. 2025;153:105530.

7. Campbell P, Bain B, Furlanetto DL, Brady MC. Interventions for improving oral health in people after stroke. Cochrane Database Syst Rev. 2020;12(12):Cd003864.

8. Tan JY, Li L, Yang YE, Wang W, Wang S. [Investigation and analysis of oral health status of children with autism and their parents' cognition]. Shanghai Kou Qiang Yi Xue. 2024;33(4):403-6.

9. Prieto D, Palacios M, Wainstein V, Ortuño D, Mora S, Chaparro A, et al. Knowledge and Experiences of Oral Health Care and Periodontitis of Caregivers of Older Adults With Cognitive Impairment. Gerodontology. 2025;42(3):342-50.

10. Toro MJ, Rivas-Tumanyan S, Murillo M, Orraca L, Garcia-Godoy B, Bencosme AK, et al. Oral Health Knowledge and Oral Hygiene Habits in a Sample of 12-Year-Old Hispanics: A Cross-sectional Study. P R Health Sci J. 2024;43(2):61-7.

11. Wong ML, Lee YH, Sim YF, Wong TJ, Soh SH, Goh BT, et al. Oral health knowledge, attitudes and behaviours of adults: Findings from a National Oral Health Survey in Singapore. Community Dent Oral Epidemiol. 2024;52(3):292-301.

12. Lipták K, Lipták L, Haba KS, Bányai D, Veres DS, Rózsa NK, et al. Oral health practices and literacy in Hungarian diabetes patients: insights from a pilot-study using a WHO-adapted questionnaire. BMC Oral Health. 2025;25(1):431.

13. Pierce J, Garaicoa-Pazmino C, Peter TK, Couso-Queiruga E, Schmerman M, Narvekar A, et al. Patient self-reported perception and knowledge of periodontal disease: An observational, university-representative, survey-based analysis in an academic setting. J Am Dent Assoc. 2025;156(3):239-50.e4.

14. Deinzer R, Jordan AR. Periodontal health literacy in Germany-Results of a telephone survey. Int J Dent Hyg. 2024;22(4):887-96.

15. Costantinides F, Vettori E, Conte M, Tonni I, Nicolin V, Ricci G, et al. Pregnancy, oral health and dental education: an overview on the northeast of Italy. J Perinat Med. 2020;48(8):829-35.

16. Thongchotchat V, Sutthiboonyapan P, Porntaveetus T, Wiriyakijja P. Relationship between periodontal health-related knowledge, belief, and behaviors: a structural equation modeling approach. BMC Oral Health. 2025;25(1):1244.

17. Ramanauskaite E, Maciulskiene V, Baseviciene N, Anuzyte R. A Survey of Lithuanian Pregnant Women's Knowledge about Periodontal Disease, Its Prevalence and Possible Influence on Pregnancy Outcomes. Medicina (Kaunas). 2024;60(9).

18. Sanz M, Marco Del Castillo A, Jepsen S, Gonzalez-Juanatey JR, D'Aiuto F, Bouchard P, et al. Periodontitis and cardiovascular diseases: Consensus report. J Clin Periodontol. 2020;47(3):268-88.

19. Warnakulasuriya S, Dietrich T, Bornstein MM, Casals E, Ide R. Oral health risks of tobacco use and effects of cessation. Int Dent J. 2020;70(3):174-80.

20. Gao X, Lo ECM, McGrath C, Ho SMY, Lin HC. Oral health knowledge, attitudes and behavior among adults in Hong Kong. BMC Oral Health. 2020;20(1):99.

21. Warnakulasuriya S, Dietrich T, Bornstein MM, Casals E, Ide R. Oral health risks of tobacco use and effects of cessation. Int Dent J. 2020;70(3):174-80.

22. World Health Organization (WHO). Oral health [Internet]. Geneva: WHO; 2022 [cited 2025 Sep 4].