

PREVALENCE AND RISK FACTORS OF PERIODONTAL DISEASE AMONG DENTAL OUTPATIENTS IN MARDAN: A CROSS-SECTIONAL STUDY

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Abstract

Background: Periodontal disease is a widespread inflammatory condition that compromises the supporting structures of teeth, significantly impacting both oral and systemic health. Despite its burden, data from underdeveloped regions remain sparse.

Objective: This study aimed to assess the prevalence and associated risk factors of periodontal disease among patients attending Bacha Khan College of Dentistry (BKCD), Mardan.

Methods: A descriptive cross-sectional study with 246 patients who had been clinically diagnosed with periodontal disease was carried out. Clinical examinations and structured questionnaires were used to gather data, with an emphasis on lifestyle choices, medical history, dental hygiene habits, and demographic factors. We used chi-square tests to find significant relationships ($p < 0.05$).

Results: The prevalence of periodontal disease among BKCD dental outpatients was 20%. A majority of participants (78.9%) presented with plaque or calculus; 60.2% experienced bleeding during brushing, and 67.1% reported tooth sensitivity. Tobacco use (33.7%) and systemic conditions such as diabetes (27.2%) were significantly associated with increased periodontal disease risk. Significant associations were also found with brushing frequency, gingival swelling, painful gums, and tooth mobility.

Conclusion: The study highlights the role of poor oral hygiene, tobacco use, and systemic conditions in the development of periodontal disease. There is a pressing need for targeted oral health education, smoking cessation programs, and early screening initiatives to reduce periodontal disease burden.

INTRODUCTION

Periodontal disease is a complex and chronic inflammatory disease condition that leads to the loss of alveolar bone and teeth. (1) It is one of the main reasons for tooth loss, which can affect one's ability

to chew, appearance, self-esteem, and quality of life. (2) Globally, the prevalence of periodontal disease has been estimated to be between 20% and 50%. (3) According to World Health Organization (WHO)

estimating that nearly 50% of adults worldwide experience some form of periodontitis, impacting their overall health and quality of life.(4) Gingivitis affects 50-90% of adult world was risk factors for PD including genetics, age, gender, smoking, socioeconomic and some systematic disease. This condition leads to a variety of inflammatory disorders that impact the supporting structures of the teeth, including the gingiva, periodontal ligament, and alveolar bone. (5) Numerous studies have established a strong association between periodontal disease and risk factors such as poor oral hygiene, tobacco use, diabetes mellitus, and increasing age. For instance, Genco and Borgnakke (2013) highlighted that tobacco users are up to six times more likely to develop periodontal disease. Similarly, Diabetic patients experience more severe periodontal destruction. (6) The periodontal disease can manifest through various clinical signs, including gingival inflammation, bleeding, and pocket formation. These manifestations are influenced by numerous factors, including demographic characteristics, lifestyle habits, and the level of awareness about periodontal health. (7) In Pakistan the prevalence of periodontal disease is notably high and remains a widespread issue, at the national level 56.62% was the overall estimate of periodontitis. Some regional studies reported that the prevalence of periodontitis was 37% in Punjab, 40% in Sindh, 20% in Khyber Pakhtunkhwa, and 3% in Baluchistan. (8) Most of these studies are concentrated in urban settings while rural areas such as Mardan in Khyber Pakhtunkhwa remain under-researched.

This study reports the prevalence of periodontal disease and its associated risk factors among patients attending Bacha Khan College of Dentistry (BKCD) Mardan in an effort to shed light on this understudied topic. The findings offer insights that could support the development of preventive programs for similar underserved populations.

Materials and Methods

Study design and study setting: A descriptive cross-sectional study was carried out at Bacha Khan

College of Dentistry (BKCD), Mardan, in the periodontology department.

Sample Size and Sampling: A total of 246 patients were included using a non-probability convenience sampling method. Using OpenEpi, the sample size was determined with a 95% confidence level, a 20% anticipated frequency, and a 5% margin of error. (9)

Inclusion Criteria: Adults aged 18 and above, both males and females, with clinically diagnosed periodontal disease.

Exclusion Criteria: Patients with periodontal treatment in the last 6 months, complete denture wearers, and those with severe physical or mental impairments.

Data Collection: Data were collected via structured questionnaires and clinical oral examination. Variables included age, gender, brushing habits, tobacco use, and presence of plaque, bleeding gums, and systemic conditions like diabetes.

Ethical

The research proposal was submitted to the Institutional Research Committee of CMT, along with a written application for data collection approval at Bacha Khan College of Dentistry (BKCD). Ethical clearance was obtained from the Advanced Studies and Research Board (ASRB) of MMC. Informed consent was taken from all participants prior to data collection.

Considerations:

Statistical Analysis: Data analysis was done with SPSS 27. Data were summarized using descriptive statistics. Chi-square tests, with $p < 0.05$ deemed significant, were employed to evaluate correlations between variables and periodontal disease.

Results

Participant Demographics:

Total 246 participants were included in the study in which 56.6% were male and 43.5% were female, with the highest disease frequency observed in the 40-50 years age group (35.2 %) followed by 30-40 age-group (25.5%) (Table 1).

Table: 1 Demographic profile of Participants

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	139	56.5%
	Female	107	43.5%
Age group	20-30 years	40	15.0%
	30-40 years	68	25.5%
	40-50 years	94	35.2%
	50-60 years	65	24.3%

Oral Hygiene Practices and Lifestyle:

Brushing behavior varied widely across the participants. The majority of individuals (92.3%) brushed gently, with 93.9% using soft- bristled toothbrushes, aligning with recommended methods to minimize gingival trauma and enamel abrasion. However, brushing frequency was insufficient for a

significant portion, as only 20.7% brushed twice daily, and 38.6% reported brushing rarely, highlighting a gap in adherence to optimal oral hygiene practices. The minimal percentage of participants brushing three times daily (0.8%) further underscores inadequate plaque control, which is a key contributor to periodontal disease.

Table 2: Oral Hygiene and Lifestyle Factors

Variable	Category	Frequency (n)	Percentage (%)
Brushing Frequency	3 times a day	95	38.6%
	Once Daily	98	39.8%
	Twice Daily	51	20.7%
	Thrice Daily	2	0.8%
Brushing Style	Gently	227	92.3%
	Aggressively	19	7.7%
Toothbrush type	Soft-bristled	231	93.9%
	Hard-bristled	15	6.1%

Clinical Findings:

Plaque or calculus was present in 78.9% of patients, the most dominant risk factor, followed by **Tooth sensitivity** (67.1%) and **bleeding while brushing** (60.2%).

Tooth mobility (12.2%) and **gingival swelling** (33.3%) reflected disease progression. 27.2% had systemic illnesses, predominantly **diabetes**, which correlated strongly with disease severity.

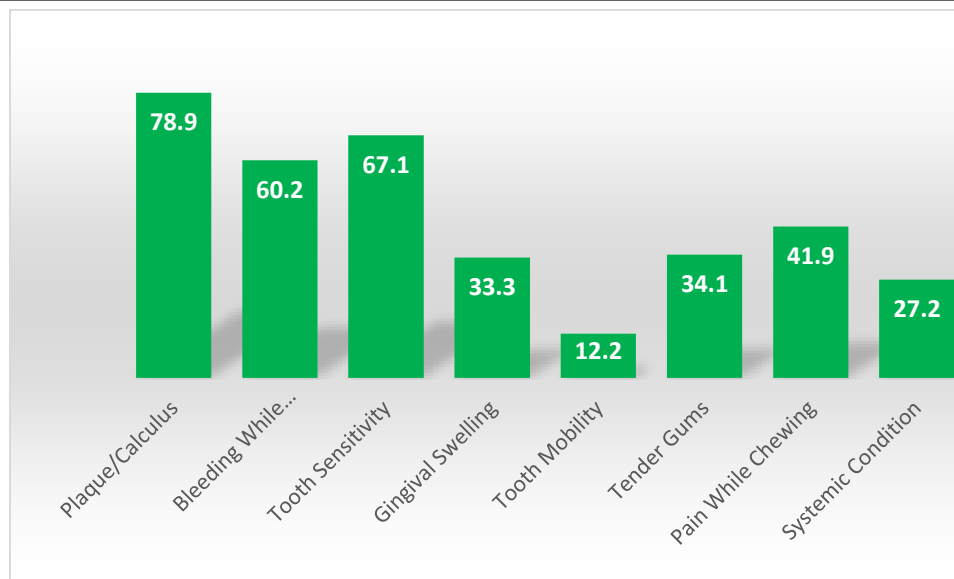


Figure 1 Prevalence of Clinical Risk Factors in Periodontal Disease

Chi-Square Analysis of Periodontal Disease and Associated Factors

The Chi-Square analysis highlights the statistical significance of various risk factors associated with periodontal disease. Highly significant factors ($p < 0.001$) include brushing frequency, tobacco use, bleeding while brushing, tooth sensitivity, plaque or calculus on teeth, and systemic medical conditions, emphasizing their critical role in periodontal

disease progression. Significant factors ($p < 0.05$) such as gingival swelling, gingival color changes, tooth mobility, tender gums, and pain while chewing also demonstrate their association with the disease. However, variables like gender ($p = 0.077$) and brushing style ($p = 0.090$) were not statistically significant, suggesting these may have a limited independent impact.

Associated Factor	Category	Frequency	Percentage (%)	Chi-Square Value	p-Value	Significance
Tobacco Use	Yes	83	33.7	12.45	<0.001	Highly Significant
	No	163	66.3			
	Total	246	100.0			
Bleeding While Brushing	Yes	148	60.2	18.92	<0.001	Highly Significant
	No	98	39.8			
	Total	246	100.0			
Tooth Sensitivity	Yes	165	67.1	16.23	<0.001	Highly Significant
	No	81	32.9			
	Total	246	100.0			

Plaque/Calculus on Teeth	Yes	194	78.9	25.87	<0.001	Highly Significant
	No	52	21.1			
	Total	246	100.0			
Gingival Swelling	Yes	82	33.3	8.45	0.004	Significant
	No	164	66.7			
	Total	246	100.0			
Medical Conditions	Yes	67	27.2	15.67	<0.001	Highly Significant
	No	179	72.8			
	Total	246	100.0			
	Yes	103	41.9	5.41	0.020	Significant

Statistical Associations:

Significant associations ($p < 0.05$) were found between periodontal disease and tobacco use, brushing frequency, bleeding while brushing, presence of plaque, systemic conditions, gingival color, and tooth mobility. Among these there were highly significant association (0.001) between periodontal disease and tobacco use, bleeding while brushing, tooth sensitivity, plaque/calculus on teeth.

Discussion and Recommendations

The prevalence of periodontal disease and its risk factors among Mardan's dental outpatients are crucially revealed by this study. The results show that periodontal disease is multifactorial and point to a number of systemic and behavioral factors that can be changed.

Participants were mostly in the 30- to 50-year-old age range, with the 40- to 50-year-old age group having the highest prevalence. This is consistent with research by Albandar et al. (2005) and Nazir et al. (2017), which show that a peak in periodontal disease occurs in middle age as a result of accumulated plaque exposure and a gradual loss of periodontal attachment. (10,11) Nazir (2017) also underlined that oral hygiene habits, socioeconomic status, and systemic conditions all have a significant impact on the prevalence of periodontal disease in Pakistan and the Middle East. His results corroborate the correlations found in our research, especially the part that diabetes and

infrequent brushing practices play in the progression of periodontal disease. (11)

Brushing habits became a significant issue. Although the majority of patients brushed gently and with soft-bristled brushes, only 20.7% brushed twice a day, and nearly 39% brushed infrequently. Gum bleeding and plaque retention were substantially correlated with infrequent brushing. These findings are consistent with a systematic review and meta-analysis conducted by Zimmermann et al. (2015), which found that those who brushed less frequently had a 1.4-fold increased risk of developing periodontitis. (12)

Additionally, there was a significant correlation between tobacco use and periodontal disease, with 33.7% of patients using tobacco. This is consistent with Genco and Borgnakke (2013), who showed that smokers had a 2–6 times higher risk of developing periodontitis. Nicotine speeds up the breakdown of periodontal tissue by decreasing vascularity and compromising immunological response. (6)

Worsening periodontal status was also associated with systemic conditions, especially diabetes mellitus (27.2% of cases). Diabetes patients frequently have delayed wound healing and heightened inflammatory reactions, which worsen periodontal disease. Chapple and Genco (2013), who stressed the reciprocal relationship between diabetes and periodontitis, lend support to this. (13)

Plaque/calculus was detected in 78.9% of patients, tooth sensitivity in 67.1%, bleeding during brushing

in 60.2%, chewing pain in 41.9%, and tooth mobility in 12.2% of patients studied. These results are consistent with the way periodontal disease manifests clinically in other populations. In Trinidad and Tobago, for instance, a cross-sectional study found that 73.1% of people with periodontitis had tooth sensitivity, with strong associations found between gingival recession and plaque accumulation. (14)

Additionally, compared to general outpatient clinics, a descriptive study conducted at a tertiary care center in Nepal revealed that 39.9% of patients had tooth mobility, which is higher than our cohort. This suggests that dental patient populations may present with more advanced disease. (15)

These indicators highlight the necessity of increased public awareness and routine screening, especially since even minimal tooth mobility indicates clinically significant tissue damage and a higher risk of tooth loss if left untreated.

The information points to the obvious need for focused interventions in the area. Public health programs ought to give priority to community-based oral hygiene education, tobacco cessation programs, Diabetes screening in dental clinics, as well as routine dental checkups, particularly for middle-aged adults.

Limitations:

Non-probability sampling was employed in this study, which might have limited its generalizability. There may be biasness in self-reported data on tobacco use and brushing habits. Furthermore, causal inference cannot be made because the study is cross-sectional.

Conclusion:

This study found a periodontal disease prevalence of 20% among patients visiting a dental outpatient department, with key risk factors including poor oral hygiene practices, tobacco use, and systemic conditions like diabetes. The findings highlight the significant burden of periodontal disease in middle-aged adults, especially those with inadequate oral care and pre-existing medical conditions. The strong associations found highlight the importance of early clinical recognition of behavioral and systemic contributors in preventing the progression of periodontal tissue destruction.

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