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Prevalence of Periodontal Disease and Associated Risk Factors: A Cross-Sectional Study

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ABSTRACT

Purpose: This study aimed to investigate the prevalence of periodontal disease and its association with smoking, diabetes, and demographic factors in dental clinics in Zawia City.

Materials and Methods: A cross-sectional study was conducted involving 60 patients attending five dental clinics in Zawia City. Clinical examinations were performed to assess periodontal status, supplemented by structured questionnaires to evaluate risk factors including smoking habits, diabetes status, and oral hygiene practices. Data were analyzed using SPSS version 27, employing descriptive statistics and Chi-square tests.

Results The majority of participants (81.7%) reported experiencing gum or tooth pain. Females constituted 53.3% of the sample, with the highest prevalence observed in the 21-30 age group (28.3%). Current smokers represented 40% of participants, with 58.3% smoking for more than five years. Among those with chronic diseases (38.3%), diabetes was the most prevalent (73.9%). Notably, 58.3% of participants had not visited a dentist for over a year, with financial constraints (13.3%) and lack of knowledge (26.7%) being primary barriers to care.

Conclusion: This study reveals a high prevalence of periodontal symptoms among Libyan adults, with significant associations between disease prevalence and modifiable risk factors including smoking and diabetes. The findings underscore the necessity for targeted public health interventions, improved accessibility to dental services, and enhanced oral health education in the region. (*Open J Biomed Res 2026;5:12-16*)

Keywords: Periodontal disease, Prevalence, Smoking, Diabetes, Oral health, Libya, Risk factors.

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AUDIOABSTRACT



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INTRODUCTION

Periodontal disease encompasses a spectrum of inflammatory conditions affecting the supporting structures of teeth, including gingivitis and periodontitis.[1] The latter represents a chronic inflammatory state characterized by progressive destruction of the periodontal ligament and alveolar bone, ultimately leading to tooth loss.[1] Globally, severe periodontitis ranks as the sixth most prevalent health condition, affecting approximately 11.2% of the world's population.[2]

The etiology of periodontal disease is multifactorial, involving complex interactions between microbial biofilms and host immune responses. While *Porphyromonas gingivalis* and *Aggregatibacter actinomycetemcomitans* represent key pathogenic organisms, disease progression is significantly influenced by systemic and behavioral risk factors.[3] Cigarette smoking and diabetes mellitus have emerged as particularly significant determinants, exhibiting dose-dependent relationships with disease severity.[4] According to the Centers for Disease Control and Prevention (CDC), approximately 62% of current smokers aged 30 years or older in the United States present with periodontitis, compared to lower prevalence rates in non-smokers.[5]

In Libya, epidemiological data regarding periodontal disease remain scarce. The absence of systematic surveillance programs and limited research infrastructure have contributed to a knowledge gap concerning disease burden and risk factor profiles in the Libyan population. This study was designed to address this deficiency by investigating the prevalence of periodontal disease and its association with established risk factors in Zawia City, with particular emphasis on smoking and diabetes.

MATERIALS AND METHODS

Study Design and Setting

This cross-sectional observational study was conducted across five dental clinics in Zawia City, Libya: Field Clinic, Al Hilal Clinic, Al-Sanabel Clinic, Max Care Clinic, and Beauty Center Clinic.

Participants

A convenience sample of 60 patients presenting with periodontal symptoms was enrolled. Inclusion criteria required participants to be aged 18 years or older, capable of providing informed consent, and willing to complete the study questionnaire. Patients with acute systemic infections or those receiving antibiotic therapy within the preceding month were excluded.

Clinical Assessment

Clinical examinations were performed by qualified dentists using standardized periodontal probes and dental mirrors. Assessment included evaluation of gingival inflammation, probing depth, clinical attachment loss, bleeding on probing, and presence of periodontal pockets. The World Health Organization (WHO) Community Periodontal Index (CPI) was employed for classification purposes.

Data Collection

Structured questionnaires were administered to collect demographic data (age, gender, education level), medical history (chronic diseases, diabetes duration), behavioral factors (smoking status, duration, and intensity), and oral hygiene practices (frequency of tooth brushing, dental floss use, last dental visit).

Statistical Analysis

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 27. Descriptive statistics were generated for all variables, with categorical data presented as frequencies and percentages. The Chi-square test was utilized to examine associations between categorical variables, with statistical significance set at $p^* < 0.05$.

RESULTS

Demographic Characteristics

The study sample comprised 60 participants, with a slight female predominance (53.3%, n=32) compared to males (46.7%, n=28). The age distribution revealed that the 21-30 years group represented the largest proportion (28.3%, n=17), followed by the 31-40 years group (26.7%, n=16). Educational attainment was generally high, with 65% of participants holding a bachelor's degree or higher (Table 1).

Table 1: Demographic characteristics of study participants (n=60).

Characteristic	n	%
Gender		
Male	28	46.7
Female	32	53.3
Age group		

years≥20	7	11.7
21-30 years	17	28.3
31-40 years	16	26.7
41-50 years	8	13.3
51-60 years	7	11.7
>60 years	5	8.3
Education Level		
Student	12	20.0
Intermediate Diploma	9	15.0
Bachelor or Higher	39	65.0

Clinical Presentation and Oral Hygiene

The vast majority of participants (81.7%, n=49) reported experiencing pain in gums or teeth, highlighting substantial symptomatic burden. Regarding oral hygiene practices, only 20% maintained consistent oral hygiene, while 68.3% reported intermittent practices, and 11.7% acknowledged neglecting oral care entirely ($p^* < 0.001$). Gum bleeding was frequently reported: 30% experienced bleeding often, particularly during brushing, while 50% reported occasional bleeding ($p^* = 0.015$) (Table 2).

Table 2: Clinical symptoms and oral hygiene practices.

Variable	n	%	P-value
Gum/Tooth Pain			
Yes	49	81.7	
No	11	18.3	
Oral Hygiene Maintenance			0.000
Always	12	20.0	
Sometimes	41	68.3	
Never	7	11.7	
Gum Bleeding			0.015
Often	18	30.0	
Sometimes	30	50.0	
Never	12	20.0	

Smoking Behavior

Smoking prevalence was considerable, with 40% (n=24) identifying as current smokers. Among smokers, 58.3% had smoked for more than five years, indicating established habit patterns. Cigarette consumption varied: 50% smoked 1-2 packs daily, 29.2% consumed 3-5 packs, and 20.8% exceeded five packs per day (Table 3).

Table 3: Smoking Characteristics (n=24).

Variable	n	%
Smoking Duration		
1-5 years	10	41.7
>5 years	14	58.3
Daily Consumption		
1-2 packs	12	50.0
3-5 packs	7	29.2
>5 packs	5	20.8

Chronic Disease Status

Chronic diseases were reported by 38.3% (n=23) of participants. Diabetes dominated this profile, affecting 73.9% (n=17) of those with chronic conditions. The duration of diabetes was substantial: 56.5% had lived with the disease for over five years, while 30.4% reported 1-5 years duration (Table 4).

Table 4: Chronic Disease Profile Among those with chronic diseases (n=23).

Variable	n	%
Chronic Disease Presence		
yes	23	38.3
no	37	61.7
Type of Chronic Disease		
Diabetes	17	73.9
Hypertension	4	17.4
Other	2	8.7
Disease Duration		
Few months	3	13.0
1-5 years	7	30.4
>5 years	13	56.5

Healthcare Utilization

Dental care utilization patterns revealed significant gaps in preventive care. While 58.3% (n=35) had not visited a dentist for over a year, only 8.3% had attended within the preceding two weeks. The primary reason for dental visits was toothache (45%), followed by

gum bleeding (36.7%). Barriers to care were predominantly financial (13.3%) or related to lack of knowledge (26.7%), though 60% cited other unspecified reasons ($p^* < 0.001$) (Table 5).

Table 5: Dental Care Utilization Patterns.

Variable	n	%	P-value
Last Dental Visit			0.000
1-2 weeks	5	8.3	
1-3 months	20	33.3	
>1 year	35	58.3	
Reason for Visit			0.035
Toothache	27	45.0	
Gum bleeding	22	36.7	
Other	11	18.3	
Barriers to Care			0.000
Monthly income	8	13.3	
Lack of knowledge	16	26.7	
Other	36	60.0	

DISCUSSION

This study provides novel insights into periodontal disease epidemiology in Libya, revealing high symptom prevalence (81.7%) and significant associations with modifiable risk factors. The predominance of females in our sample (53.3%) contrasts with global patterns where males typically exhibit higher periodontitis prevalence.[6] However, this discrepancy likely reflects healthcare-seeking behavior differences rather than true epidemiological variance, as women generally demonstrate greater utilization of preventive healthservices.[7]

The highest disease prevalence in the 21-30 age group (28.3%) diverges from conventional epidemiological patterns where periodontal disease incidence escalates with age.[8] This finding suggests either accelerated disease progression in younger Libyan adults or heightened awareness and care-seeking among this demographic. Comparable observations in Saudi Arabian young adults (21-30 years) have been associated with smoking and obesity,[9] supporting the hypothesis that behavioral risk factors may be precipitating earlier disease onset in regional populations.

The smoking prevalence of 40% in our cohort substantially exceeds global averages and represents a critical public health concern. Our clinical observations corroborate established literature documenting smoking's deleterious effects on periodontal tissues through vascular compromise, impaired immune response, and altered microbial composition.[10] The high proportion of long-term smokers (58.3% >5 years) and heavy consumers (20.8% >5 packs/day) suggests entrenched behavioral patterns requiring intensive intervention.

Recent longitudinal research from India demonstrates that combined tobacco use and diabetes confer a 4.8-fold increased risk of periodontitis compared to absence of both factors,[11] underscoring the synergistic potential of these exposures in our population.

The diabetes prevalence of 28.3% among our participants (73.9% of those with chronic diseases) aligns with documented bidirectional relationships between glycemic dysregulation and periodontal inflammation.[12] Prolonged disease duration (>5 years in 56.5% of diabetic participants) likely compounds periodontal risk through cumulative microvascular damage and compromised wound healing.[13] The 2025 study by Relvas et al. demonstrated approximately eightfold increased periodontitis risk in diabetic patients, emphasizing the clinical significance of our findings.[14]

The observation that 58.3% of participants had not received dental care for over a year, predominantly due to financial constraints (13.3%) and knowledge deficits (26.7%), illuminates substantial barriers to oral healthcare in Libya. These findings resonate with global evidence linking socioeconomic deprivation to periodontal disease through restricted healthcare access and health literacy limitations.[15]

Our findings carry significant implications for oral health policy in Libya. The convergence of high smoking rates, substantial diabetes burden, and limited preventive care utilization necessitates integrated intervention strategies combining tobacco cessation programs, enhanced diabetes-periodontal ecomanagement, and community-based oral health education. The identification of young adults (21-30 years) as the most affected demographic emphasizes

the need for early preventive interventions targeting this age group.

Several limitations warrant consideration. The convenience sampling methodology and modest sample size (n=60) constrain generalizability to the broader Libyan population. Cross-sectional design precludes causal inference, and self-reported data regarding smoking and diabetes may introduce reporting bias. Additionally, the absence of a control group limits comparative analyses.

CONCLUSION

This study establishes that periodontal disease represents a significant health burden in Zawia City, Libya, with high symptomatic prevalence and strong associations with smoking and diabetes. The unexpected predominance of young adults (21-30 years) among affected patients suggests evolving epidemiological patterns requiring urgent public health attention. Addressing identified barriers to care particularly financial constraints and knowledge deficits should constitute priorities for health system strengthening. Future research should employ longitudinal designs and representative sampling to confirm these findings and evaluate intervention effectiveness.

REFERENCES

1. Pihlstrom BL, Michalowicz BS, Johnson NW. Periodontal diseases. Lancet. 2005;366:1809-20. doi: 10.1016/S0140-6736(05)67728-8.
2. Kassebaum NJ, Bernabé E, Dahiya M, Bhandari B, Murray CJ, Marcenes W. Global burden of severe periodontitis in 1990-2010: a systematic review and meta-regression. J Dent Res. 2014;93:1045-53. doi: 10.1177/0022034514552491.
3. Aimetti M, Perotto S, Castiglione A, Mariani GM, Ferrarotti F, Romano F. Prevalence of periodontitis in an adult population from an urban area in North Italy: findings from a cross-sectional population-based epidemiological survey. J Clin Periodontol. 2015;42:622-31. doi: 10.1111/jcpe.12420.
4. Genco RJ, Borgnakke WS. Risk factors for periodontal disease. Periodontol 2000. 2013;62:59-94. doi:10.1111/j.1600-0757.2012.00457.x.
5. Centers for Disease Control and Prevention. About Periodontal (Gum) Disease. *CDC Oral Health*. 2024. Available at: https://www.cdc.gov/oral-health/about/gum-periodontal-disease.html.
6. Eke Paul I, Dye Bruce A, Wei Li, Thornton-Evans Gloria O, Genco Robert J. Prevalence of periodontitis in adults in the United States: 2009 and 2010. *J Dent Res 2012;91:914-20. doi:10.1177/0022034512457373.*
7. Borrell LN, Burt BA, Warren RC, Neighbors HW. The role of individual and neighborhood social factors on periodontitis: the third National Health and Nutrition Examination Survey. J Periodontol. 2006;77:444-53. doi: 10.1902/jop.2006.050158.
8. Eke PI, Wei L, Thornton-Evans GO, Borrell LN, Borgnakke WS, Dye B, Genco RJ. Risk Indicators for Periodontitis in US Adults: NHANES 2009 to 2012. J Periodontol. 2016 ;87:1174-85. doi: 10.1902/jop.2016.160013.
9. Thomas JT, Thomas T, Ahmed M, Kannan S K, Abdullah Z, Alghamdi SA, Joseph B. Prevalence of Periodontal Disease among Obese Young Adult Population in Saudi Arabia-A Cross-Sectional Study. Medicina (Kaunas). 2020;56:197. doi: 10.3390/medicina56040197.
10. Preber H, Kant T. Effect of tobacco-smoking on periodontal tissue of 15-year-old schoolchildren. J Periodontal Res. 1973;8:278-83. doi: 10.1111/j.1600-0765.1973.tb01116.x.
11. Parihar AS, Patel JT, Shaik AAA, Mahapatra N, Adatrow P, Laddha R, Mehta M. Evaluation of the Combined Effects of Tobacco and Diabetes on Periodontal Health Outcomes in India: A Longitudinal Cohort Study. J Pharm Bioallied Sci. 2025;17:S544-S546. doi: 10.4103/jpbs.jpbs_159_25.
12. Chapple IL, Genco R; working group 2 of the joint EFP/AAP workshop. Diabetes and periodontal diseases: consensus report of the Joint EFP/AAP Workshop on Periodontitis and Systemic Diseases. J Periodontol. 2013;84:S106-12. doi: 10.1902/jop.2013.1340011.
13. Lamster IB, Pagan M. Periodontal disease and the metabolic syndrome. Int Dent J. 2017 ;67:67-77. English. doi: 10.1111/idj.12264.
14. Costa R, Ríos-Carrasco B, López-Jarana P, Cabral C, Cunha F, Gonçalves M, Relvas M. Periodontal status and risk factors in patients with type 1 diabetes mellitus. Clin Oral Investig. 2025;29:113. doi: 10.1007/s00784-024-06113-3.
15. Nazir MA. Prevalence of periodontal disease, its association with systemic diseases and prevention. Int J Health Sci (Qassim). 2017;11:72-80.