Factors Associated with Periodontal Status and Treatment Needs Among Older People in Prosthodontic Department of a Non-Government Dental College: A Cross-Sectional Study

Tamij N.[1*], Ahmed A.[2], Islam M.S.[3], Sharmin S.[4], Mannan H.[5], Kader M.A.[6], Nuruzzaman K.[7], Hossain S.M.[8]

Abstract:

Aim: The aim of the study was to assess factors associated with periodontal status and treatment needs among older people in prosthodontic department of a non-Government dental college

Methods: Purposively selected sample consisted of 110 elderly adults aged 60 and older, seeking prosthodontic care. Demographic information was collected through a pretested structured questionnaire and periodontal condition assessed using checklist. Descriptive statistics were used to characterize demographic variables and to assess associations between periodontal health status and other factors by chi-square test and fisher's exact test ($p < 0.05$)

Results: The study examines the distribution of CPITN scores among elderly participants based on demographic factors. The results show diverse periodontal health status, ranging from healthy periodontium to pathological pockets of variable widths. No participants had healthy periodontium among various demographic variables. Females had 28.2% of supra and subgingival calculus, 13.6% had pathological pockets of 4-5mm, and 19.1% had pathological pockets of 6mm or greater. Men had 1.8%, and 16.4% displayed pathological pockets of 6mm or greater. Age group 65-70 had 12.7% of pathological pockets of 6mm or greater. Muslim, Hinduism, married, and primary education individuals had higher rates of bleeding on probing, supra and subgingival calculus, and pathological pockets. Business people had the highest percentage of people with pathological pockets of 6mm or greater. The study found significant associations ($p<0.05$) between systemic disorders, missing teeth, mobility of teeth, dental prostheses, tooth brushing frequency, and rinsing after meals. The study also found an association ($p<0.05$) between CPI scores and the TN category, with 70% of participants needing TN2 therapy for those with CPI scores 2 and 3, followed by 28.3% for CPI score 4.

Conclusion: The study found that elderly individuals with missing teeth, dental mobility, systemic disorders, and lower educational attainment have a higher risk of periodontal disease. Additionally, those who brush their teeth daily and never rinse after meals have a higher prevalence of pathological pockets. Therefore, identifying and addressing these risk factors is crucial to prevent or delay the development of periodontal disease in older people.

Keywords: Periodontal status, Treatment needs, Older people

1. **Nusrat Tamij,** Lecturer, Department of Prosthodontics, University Dental College, Dhaka.

2. **Anam Ahmed**, Associate Professor (C.C), Department of Dental Public Health. University Dental College, Dhaka.

3. **Md.Saiful Islam**, Professor (C.C) & Head, Department of Prosthodontics, University Dental College, Dhaka

*Corresponding Author:

Dr. Nusrat Tamij, Lecturer, Department of Prosthodontics, University Dental College & Hospital, Dhaka.
Email: nusrattamij@gmail.com

4. **Prof. Salma Sharmin, Professor & Head,** Department of Dental Public Health. University Dental College, Dhaka.

5. **Huda Mannan**, Associate Professor (C.C), Department of Paediatric Dentistry, University Dental College

6. **Md. Abdul Kader**, Assistant Professor (C.C), Department of Orthodontic & Dentofacial Orthopedics, University Dental College, Dhaka.

7. **Khandakar Nuruzzaman,** Assistant Professor (C.C), Department of Paediatric Dentistry, University Dental College, Dhaka

8. **Md.Suman Hossain**, Lecturer, Department of Dental Public Health, University Dental College.

Introduction

The field of dentistry has undergone major developments throughout the years, resulting in longer lifespan and improved dental health among the older population.[1] The dental well-being of senior adults is of fundamental importance, as it not only effects their general health but also greatly adds to their quality of life.[2] With the worldwide trend of population aging on the rise, it becomes increasingly necessary to focus on the oral health of the senior population due to the rising prevalence of oral problems, notably periodontal diseases.[3] These disorders can lead to major repercussions, such as tooth mobility, tooth loss, and impaired masticatory function.[4] Moreover, in prosthodontics, the assessment of periodontal health is crucial, as the presence of dental prostheses can affect the oral microenvironment and potentially influence periodontal health outcomes.[5] The link between periodontal infections and systemic issues, such as cardiovascular diseases and diabetes, has gained heightened attention in recent years.[6] Demographic variables, including as age, gender differences, socio-economic determinants, dentition status, and systemic illnesses have been recognized as possible effects on periodontal health in the senior population.[7] Meanwhile, The Community Periodontal Index of Treatment Needs (CPITN) is a generally recognized approach for evaluating periodontal health, separating individuals into numerous periodontal health status groups.[8,9] The study attempts to address this research gap by assessing demographic, dentition-related attributes, prosthetic, systemic, and lifestyle factors in senior individuals having treatment within the prosthodontic department of a non-government dental college among the senior population in context of Bangladesh.

Methods

This cross-sectional study was conducted to examine characteristics related to periodontal health status and treatment needs among older people in the prosthodontic department of the University Dental College (UDC).

The study had a sample size of 110 elderly adults. Purposive sampling was applied to choose participants based on particular inclusion criteria: age 60 years and older and persons seeking prosthodontic care in the dental OPD of prosthodontics department. Participants were offered a structured questionnaire to gather demographic information, including age, gender, education, income, and employment. Data was acquired by pre-testing a semi-structured questionnaire and checklist through face-to-face interviews and intraoral clinical examinations accordingly. The questionnaire also includes items concerning systemic health issues, such as diabetes, cardiovascular disorders and others. A checklist was applied to record data on periodontal health conditions, dentition status, and prosthetic elements. missing teeth and tooth mobility to determine dentition status. Additionally, information on the existence and kind of dental prosthesis was noted. The periodontal health condition of participants was assessed using the CPITN index.[8] Trained periodontal examiners performed oral examinations to assess periodontal diseases, including gingival bleeding and pocket depth. The CPITN categorizes periodontal health into two domains. During the intraoral clinical examination, firstly record the community periodontal index (CPI) score in 5 categories: Score 0 (healthy periodontal tissues), Score 1 (bleeding observed during/after probing), Score 2 (presence of supra and sub gingival calculus deposits with bleeding), Score 3 (shallow periodontal pockets, pocket depth 4-5 mm), and Score 4 (deep periodontal pockets, pocket depth 6mm or above). Then, secondly, according to the CPITN score, interventions regarding treatment needs (TN) are classified as TN0 (no treatment needed), TN1 (oral hygiene instruction), TN2 (oral hygiene instruction scaling & root planning), and TN3 (oral hygiene instruction, scaling, root planning and periodontal therapy). Statical analysis was done through IBM SPSS software version 27. Whereas, Descriptive statistics were applied to characterize demographic variables such as dental status, prosthetic features, systemic disorders, and risk factors in tables.

The frequency distribution of periodontal health status as per the CPITN categories was determined. Regarding inferential statistics, associations between periodontal health status and various factors, such as demographic variables, systemic conditions and other variable were assessed using appropriate statistical tests, such as chi-square tests or Fisher's exact test, at a 5% level of significance ($p < 0.05$). The study gained ethical approval from the Bangladesh Open University (BOU) and informed written consent was obtained from the hospital director of UDC as well as from all participants before data collection.

Results

Table 1 presents a comprehensive examination of the distribution of CPITN scores among the elderly participants (n = 110) based on several demographic factors. The CPITN values indicate diverse periodontal health states, ranging from healthy periodontium to pathological pockets of variable widths (4-5mm and 6mm or greater). The data demonstrates that there were no participants with healthy periodontium (Score 0) among various demographic variables. Among females, 28.2% had supra and subgingival calculus (Score 2), 13.6%

1. Demographic characteristics of the participants associated with CPITN score (n-110)

Attributes	Health Periodontium (Score 1) f (%)	Bleeding observed during/after probing (Score 2) f (%)	Presence of supra & sub-gingival Calculus (Score 3) f (%)	Pathological Pocket (4-5mm) (Score 4) f (%)	Pathological Pocket (6mm or more) (Score 5) f (%)	Total f (%)	P value
Gender							
Female	0(0.0%)	0(0.0%)	31(28.2%)	15(13.6%)	21(19.1%)	67(60.9%)	.131
Male	0(0.0%)	2(1.8%)	16(14.5%)	15(13.6%)	10(9.1%)	43(39.1%)	
Age group							
60-64	0(0.0%)	2(1.8)	38(34.5)	16(14.5%)	27(24.5%)	83(75.5%)	**.010**
65-70	0(0.0%)	0(0.0%)	9(8.2%)	14(12.7%)	4(3.6%)	27(24.5%)	
Religion							
Islam	0(0.0%)	2(1.8%)	30(27.3%)	19(17.3%)	13(11.8%)	64(58.2%)	.126
Hinduism	0(0.0%)	0(0.0%)	17(15.5%)	11(10.0%)	18(16.4%)	46(41.8%)	
Marital status							
Married	0(0.0%)	2(1.8%)	41(37.3%)	23(20.9%)	28(25.5%)	94(85.5%)	
Widow/widower	0(0.0%)	0(0.0%)	4(3.6%)	4(3.6%)	2(1.8%)	10(9.1%)	.746
Divorced	0(0.0%)	0(0.0%)	2(1.8%)	3(2.7%)	1(0.9%)	6(5.5%)	
Highest level of education							
Primary	0(0.0%)	0(0.0%)	20(18.2%)	5(4.5%)	6(5.5%)	31(28.2%)	**.003**
S.S.C	0(0.0%)	0(0.0%)	3(2.7%)	2(1.8%)	7(6.4%)	12(10.9%)	
H.S.C	0(0.0%)	0(0.0%)	7(6.4%)	6(5.5%)	8(7.3%)	21(19.1%)	
Graduation	0(0.0%)	2(1.8%)	4(3.6%)	10(9.1%)	8(7.3%)	24(21.8%)	
Post-graduation	0(0.0%)	0(0.0%)	13(11.8%)	7(6.4%)	2(1.8%)	22(20.0%)	
Occupation							
Businessman	0(0.0%)	0(0.0%)	8(7.3%)	14(12.7%)	4(3.6%)	26(23.6%)	**< .001**
Service holder	0(0.0%)	0(0.0%)	4(3.6%)	2(1.8%)	0(0.0%)	6(5.5%)	
House wife	0(0.0%)	0(0.0%)	15(13.6%)	12(10.9%)	20(18.2%)	47(42.7%)	
Retired	0(0.0%)	2(1.8%)	20(18.2%)	2(1.8%)	7(6.4%)	31(28.2%)	

Monthly family income (taka)							
20000-60000	0(0.0%)	2(3.6%)	28(50.0%)	12(21.4%)	14(25.0%)	56(100.0%)	.151
60001-100000	0(0.0%)	0(0.0%)	19(35.2%)	18(33.3%)	17(31.5%)	54(100.0%)	
Systemic disease							
No	0(0.0%)	2(1.8%)	26(23.6%)	4(3.6%)	8(7.3%)	40(36.4%)	**< .001**
Asthma	0(0.0%)	0(0.0%)	0(0.0%)	4(3.6%)	6(5.5%)	10(9.1%)	
Diabetes mallitus	0(0.0%)	0(0.0%)	12(10.9%)	6(5.5%)	16(14.5%)	34(30.9%)	
CVD	0(0.0%)	0(0.0%)	0(0.0%)	9(8.2%)	0(0.0%)	9(8.2%)	
Both	0(0.0%)	0(0.0%)	6(5.5%)	7(6.4%)	1(0.9%)	14(12.7%)	
Hypertension	0(0.0%)	0(0.0%)	3(2.7%)	0(0.0%)	0(0.0%)	3(2.7%)	

f= frequency, %= percentage

had pathological pockets of 4-5mm (Score 3), and 19.1% had pathological pockets of 6mm or greater (Score 4). Similarly, among men, 1.8% demonstrated bleeding on probing (Score 1), and 9.1% had pathological pockets of 6mm or greater (Score 4), demonstrating that gender was not substantially linked with CPITN scores. Moreover, the data for age categories reveal that among patients aged 60–64, 34.5% displayed supra and subgingival calculus (Score 2), and 24.5% had pathological pockets.

Table 2: Association between oral hygiene practice, dentition and prosthesis status with CPITN score of participants (n-110)

Attributes	Community Periodontal Index Treatment Needs (CPITN)						P value
	Health Periodontium (Score 1) f (%)	Bleeding observed during/after probing (Score 2) f (%)	Presence of supra & subgingival Calculus (Score 3) f (%)	Pathological Pocket (4-5mm) (Score 4) f (%)	Pathological Pocket (6mm or more) (Score 5) f (%)	Total f (%)	
Missing tooth							
1-3 teeth	0(0.0%)	0(0.0%)	5(15.2%)	15(45.5%)	13(39.4%)	33(100.0%)	**<.001**
4-6 teeth	0(0.0%)	2(8.3%)	15(62.5%)	4(16.7%)	3(12.5%)	24(100.0%)	
7-9 teeth	0(0.0%)	0(0.0%)	27(50.9%)	11(20.8%)	15(28.3%)	53(100.0%)	
Mobility							
No	0(0.0%)	0(0.0%))	25(59.5%))	14(33.3%))	3(7.1%)	42(100.0%)	.001
Yes (1-2 teeth)	0(0.0%)	2(4.0%)	16(32.0%)	12(24.0%)	20940.0%)	100.0%)	
Yes (3-4 teeth)	0(0.0%)	0(0.0%)	6(33.3%)	4(22.2%)	8(44.4%)	18(100.0%)	
Dental Prosthesis							
Yes	0(0.0%)	2(2.8%)	32(45.1%)	24(33.8%)	13(18.3%)	71(100.0%)	**.009**
No	0(0.0%)	0(0.0%)	15(38.5%)	6(15.4%)	18(46.2%)	39(100.0%)	
Visit to dentist							
Last 6month	0(0.0%)	0(0.0%)	16(37.2%)	15(34.9%)	12(27.9%)	43(100.0%)	.185
6-12 months	0(0.0%)	2(9.5%)	9(42.9%)	6(28.6%)	4(19.0%)	21(100.0%)	
Last 1-2 years	0(0.0%)	0(0.0%)	13(44.8%)	8(27.6%)	8(27.6%)	29(100.0%)	

Frequency of tooth brushing							
once a day	0(0.0%)	2(4.5%)	30(68.2%)	1(2.3%)	11(25.0%)	44(100.0%)	**< .001**
twice a day	0(0.0%)	0(0.0%)	17(25.8%)	29(43.9%)	20(30.3%)	66(100.0%)	
Toothbrushing aids							
Brush & paste	0(0.0%)	2(2.5%)	36(44.4%)	20(24.7%)	23(28.4%)	81(100.0%)	
Brush & powder	0(0.0%)	0(0.0%)	8(47.1%)	6(35.3%)	3(17.6%)	17(100.0%)	.584
Finger & powder	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	2(100.0%)	2(100.0%)	
Miswak	0(0.0%)	0(0.0%)	3(30.0%)	4(40.0%)	3(30.0%)	10(100.0%)	
Rinse after every meal							
Always	0(0.0%)	0(0.0%)	12(54.5%)	1(4.5%)	9(40.9%)	22(100.0%)	
Sometimes	0(0.0%)	0(0.0%)	11(40.7%)	12(44.4%)	4(14.8%)	27(100.0%)	**.028**
Never	0(0.0%)	2(3.3%)	24(39.3%)	17(27.9%)	18(29.5%)	61(100.0%)	

f= frequency, %= percentage

pathological pockets of 6mm or greater (Score 4). For the age group 65–70, 12.7% exhibited pathological pockets of 6mm or greater (Score 4), demonstrating a statistically significant connection .05) between age group and CPITN scores. Among those who were Muslim, 27.3% had supra and subgingival calculus (Score 2), while 11.8% had pathological pockets of 6mm or greater (Score 4). For the Hinduism group, 16.4% displayed pathological pockets of 6mm or greater (Score 4), which was not significantly linked with CPITN scores. Among married people, 37.3% had supra and subgingival calculus (Score 2), and 25.5% had pathological pockets of 6mm or greater (Score 4), which was negligible. For individuals with primary education, 18.2% had supra- and subgingival calculus (Score 2). Notably, significant relationships were discovered between the greatest degree of education and CPITN scores (p-value =.003). Graduates and post-graduates showed

Table 3: Association between CPI score with TN score of participants (n-110)

CPITN Score	Treatment Needs (TN)			Total	P value
	TN1 OHI f (%)	TN2 OHI+SCL+RP f (%)	TN3 OHI+S-CL+RP+PT f (%)	f (%)	
Score1	2 (1.8%)	0(0.0%)	0(0.0%)	2(1.8%)	
Score 2	0(0.0%)	47(42.7%)	0(0.0%)	47(42.7%)	<.001
Score3	0(0.0%)	30(27.3%)	0(0.0%)	30(27.3%)	
Score4	0(0.0%)	0(0.0%)	31(28.2%)	31(28.2%)	
Total	2(1.8%)	77(70.0%)	31(28.2%)	110(100.0%)	

OHI= Oral hygiene instruction, SCL= Scaling, RP= root planning, PT=Periodontal therapy, f= frequency, %= percentage

increased rates of bleeding on probing (Score 1), supra and subgingival calculus (Score 2), and pathological pockets (Scores 3 and 4). Among diverse vocations, businesspeople had the greatest percentage (23.6%) of people with pathological pockets of 6mm or greater (Score 4). The connection between employment and CPITN scores was statistically significant (p-value.001). The income categories did not demonstrate a significant connection with CPITN ratings. The presence of systemic disorders was associated with varied CPITN scores. Individuals with systemic disorders such as asthma, both combinations of diseases, CVD, diabetes mellitus, and hypertension revealed varied patterns of CPITN scores. Significant associations were detected between systemic disorders and CPITN scores, with p-values.001. Table 2 also demonstrates an intriguing link between missing teeth and CPITN scores (p<.001). For instance, individuals with 1-3 missing teeth displayed a notable pattern: 45.5% of them had pathological pockets of 4-5mm (Score 3), whereas 39.4% had pockets of 6mm or greater (Score 4). The mobility of teeth also demonstrated a remarkable link with CPITN scores. Participants with mobile teeth (1-2 teeth) revealed a prevalence of bleeding on probing (Score 1) and a greater incidence of pathological pockets, notably of 4-5mm (Score 3). The obtained p-value of.001 demonstrates that dental mobility substantially impacts CPITN scores. The presence of dental prostheses was associated with varying CPITN ratings. Individuals with dental prostheses revealed differing periodontal health status compared to those without. Notably, those with dental prostheses reported greater percentages of bleeding on probing (Score 1) and supra- and subgingival calculus (Score 2). The p-value of.009 suggests that prosthesis status substantially impacts CPITN scores. The frequency of tooth brushing exhibited an interesting correlation with CPITN scores. Participants who cleaned their teeth twice a day exhibited a larger proportion of healthy periodontium (Score 0) and a lower prevalence of pathological pockets. On the other hand, individuals who brushed once a day had a greater occurrence of pathological pockets. The found p-value of.001 demonstrates a strong statistical link between tooth brushing frequency and CPITN scores. The behavior of rinsing after meals revealed a connection with CPITN scores. Those who reported constantly washing after meals had a larger percentage of healthy periodontium (Score 0) and a lower occurrence of problematic pockets. In contrast, those who reported never washing demonstrated a greater incidence of problematic pockets. The p-value of.028 implies that the frequency of washing substantially impacts CPITN scores.

Moreover, in Table 3, the association found between CPI scores and TN category that highlights diversity of periodontal diseases within this respondent (p.< .001). The bulk of the participants (70%) needed TN2 therapy for those who had CPI scores 2 and 3, followed by (28.3%) TN3 treatment for CPI score 4. Only 1.8% of the total participants (n = 2) came into the TN1 category needed OHI.

Discussion

In our study, all respondents exhibited varying degrees of periodontal disease based on the Community Periodontal Index of Treatment Needs (CPITN) scores. Notably, among those aged 60–64, 34.5% displayed subgingival calculus (Score 2), and 24.5% had pathological pockets of 6mm or greater (Score 4). Meanwhile, individuals aged 65–70 had a lower prevalence of pathological pockets (12.7%), which demonstrated a statistically significant (p < 0.05) age-associated correlation with CPITN scores. Our findings align with another research[10], where over 88% of subjects exhibited periodontal disease, with an increased prevalence of pathological pockets with age. This similarity underscores the age-related aspect of periodontal disease progression, consistent with various international studies in Croatia, Denmark, Germany, Ireland, and Bulgaria.[11-15] However, it's important to note that in some countries like France, Turkey, Hungary, China, and Spain, calculus was the most frequently observed condition in the same age group.[16] These disparities may arise from differences in oral hygiene practices, genetic predispositions, or healthcare systems, emphasizing the influence of regional and cultural factors on periodontal disease patterns. Our study contributes valuable insights into the global prevalence of periodontal disease and its age-related variations. Understanding both similarities and differences across regions can aid in tailoring dental healthcare interventions and public health strategies to address the specific needs of diverse populations.

In current study, we identified significant associations between the level of education and CPITN scores (p = .003). Specifically, graduates and post-graduates displayed elevated rates of bleeding on probing (Score 1), supra and subgingival calculus (Score 2), as well as pathological pockets (Scores 3 and 4). Notably, individuals in business-related professions exhibited the highest percentage (23.6%) of individuals with pathological pockets measuring 6mm or greater (Score 4). These findings align with another study [17] where a clear connection between educational attainment and periodontal health was evident. In their study, the only subjects who maintained periodontal health were those with a university education. The similarity between our study and the findings underscores the consistent influence of education on periodontal health. It suggests

that individuals with higher levels of education tend to exhibit better periodontal health outcomes, which may be attributed to improved oral hygiene awareness and practices among this demographic. These consistent results emphasize the importance of educational interventions in promoting oral health and preventing periodontal disease, particularly among individuals with lower levels of education. This information can guide targeted oral health programs and policies aimed at reducing disparities in periodontal health across different educational strata.

The study also revealed a significant association between occupation and periodontal health, with businesspeople displaying a higher proportion of severe periodontal conditions (p < .001). This aligns with findings from a study [18] which noted that individuals with higher education levels had both healthier and more periodontally affected sextants. These results highlight the impact of socioeconomic factors on oral health, emphasizing the need for comprehensive approaches to address disparities. However, the studies differ in focus, with one examining occupation and the other education, suggesting distinct influences on periodontal health. This underscores the complexity of socioeconomic factors in oral health outcomes and calls for further research to elucidate underlying mechanisms and inform targeted interventions.

In our study, systemic disorders, including asthma, combinations of diseases, cardiovascular disease (CVD), diabetes mellitus, and hypertension, were linked to various CPITN scores (p <.001). These findings align with previous research indicating a connection between systemic diseases and the periodontal status of older individuals. While some studies found no significant difference in periodontal treatment needs among older adults with systemic diseases, others, such as identified associations between conditions like diabetes, joint replacement, and periodontal health.[19-20] Moreover, diabetes mellitus, CVD, and respiratory diseases were associated with more severe periodontal disease.[21] These collective findings emphasize the potential impact of systemic diseases on periodontal health in older populations and underscore the importance of interdisciplinary collaboration between dental and medical professionals.

In our study, we found a significant association between tooth mobility (1-2 teeth) and CPITN scores, characterized by a higher incidence of bleeding on probing (Score 1) and an increased prevalence of pathological pockets measuring 4-5mm (Score 3) (p < .001). This discovery concurs with prior research that has linked tooth mobility to the periodontal status of older individuals where a noteworthy correlation observed between tooth mobility.[22] Likewise, another research identified a moderate positive correlation between tooth mobility and gingival crevicular blood glucose levels in patients with periodontitis.[23] Furthermore, another study found the necessity for standardized classifications of tooth mobility to enhance clarity and consistency in clinical practice, that also emphasized tooth mobility as a crucial aspect of periodontal disease.[24-25] These combined findings underscore the importance of considering tooth mobility as a contributing factor to periodontal health, emphasizing the need for further research and standardized protocols for assessing and managing tooth mobility in clinical settings.

In our study, we observed an intriguing association between the frequency of tooth brushing and CPITN scores. Notably, participants who brushed their teeth twice daily exhibited a higher proportion of healthy periodontium (Score 0) and a lower prevalence of pathological pockets. In contrast, those who brushed once a day had a higher incidence of pathological pockets. This relationship was statistically significant, as indicated by a p-value of .001. Our findings align with existing research on the connection between tooth brushing frequency and periodontal CPITN scores in older adults. For instance, another study found that individuals reporting bleeding upon brushing had elevated plaque index (PI) and gingival index (GI) scores.[26] Similarly, other study reported that those performing oral prophylaxis twice daily had a higher proportion of CPITN codes 0 and 1, whereas codes 3 and 4 were more prevalent among those who brushed once daily.[27] Furthermore, a systematic review and meta-analysis revealed confirmed that infrequent tooth brushing was associated with severe forms of periodontal disease in older adults.[28] Collectively, these findings emphasize the significance of tooth brushing frequency in influencing periodontal CPITN scores in older populations. The consistent evidence underscores the importance of promoting regular and thorough tooth brushing practices to maintain periodontal health.

Limitation of the study

This study's cross-sectional design and sample size limit its ability to establish causality and generalize findings. Self-reported oral hygiene data may be subject to bias.

Conclusion

The present study investigated the association between periodontal health and various demographic factors, systemic disorders, oral health behaviors, and missing teeth among elderly individuals. The results showed that

the proportion of pathological pockets was significantly higher in elderly individuals with missing teeth, dental mobility, systemic disorders, and lower educational attainment. In addition, those who reported brushing their teeth once a day and never rinsing after meals had a higher prevalence of pathological pockets. The findings of this study suggest that the risk of periodontal disease is higher in elderly individuals with certain demographic factors, systemic disorders, oral health behaviors, and missing teeth. Therefore, it is important to identify and address these risk factors in order to prevent or delay the development of periodontal disease in the older people.

Recommendation

Future research should employ longitudinal designs with larger, diverse samples to explore causal relationships. Validation of self-reported oral hygiene practices is essential. Healthcare providers should promote regular check-ups and oral care, especially for at-risk groups. Public health initiatives should raise awareness of systemic factors affecting periodontal health and encourage integrated care between dental and medical professionals.

Authors 'declaration

All authors declared that they have equal contribution to prepare the manuscript. They also gave their final approval and agreed to be accountable for all aspects of the work.

Conflict of interest

The authors declare no potential conflicts of interest for the authorship and/or publication of this article

References

1. Chan, A. K. Y., Tamrakar, M., Jiang, C. M., Lo, E. C. M., Leung, K. C. M., & Chu, C. H. (2021). Common Medical and Dental Problems of Older Adults: A Narrative Review. *Geriatrics (Basel, Switzerland)*, *6*(3), 76. https://doi.org/10.3390/geriatrics6030076

2. Wang, J., Zhao, J., Tian, T. *et al.* The effects of oral health and social support on health-related quality of life of migrant older with children in Weifang, China. *BMC Public Health* 22, 1505 (2022). https://doi.org/10.1186/s12889-022-13843-0

3. Clark D, Kotronia E, Ramsay SE. Frailty, aging, and periodontal disease: Basic biologic considerations. Periodontol 2000. 2021 Oct;87(1):143-156. doi: 10.1111/prd.12380. PMID: 34463998; PMCID: PMC8771712.

4. Barbe AG, Javadian S, Rott T, Scharfenberg I, Deutscher HCD, Noack MJ, Derman SHM. Objective masticatory efficiency and subjective quality of masticatory function among patients with periodontal disease. J Clin Periodontol. 2020 Nov;47(11):1344-1353. doi: 10.1111/jcpe.13364. Epub 2020 Sep 23. PMID: 32892357.

5. Srimaneepong V, Heboyan A, Zafar MS, Khurshid Z, Marya A, Fernandes GVO, Rokaya D. Fixed Prosthetic Restorations and Periodontal Health: A Narrative Review. J Funct Biomater.

2022 Feb 1;13(1):15. doi: 10.3390/jfb13010015. PMID: 35225978; PMCID: PMC8883934.

6. Liccardo D, Cannavo A, Spagnuolo G, Ferrara N, Cittadini A, Rengo C, Rengo G. Periodontal Disease: A Risk Factor for Diabetes and Cardiovascular Disease. Int J Mol Sci. 2019 Mar 20;20(6):1414. doi: 10.3390/ijms20061414. PMID: 30897827; PMCID: PMC6470716.

7. Selvaraj S, Naing NN, Wan-Arfah N, de Abreu MHNG. Demographic and Habitual Factors of Periodontal Disease among South Indian Adults. Int J Environ Res Public Health. 2021 Jul 26;18(15):7910. doi: 10.3390/ijerph18157910. PMID: 34360201; PMCID: PMC8345463.

8. Cutress TW, Ainamo J, Sardo-Infirri J. The community periodontal index of treatment needs (CPITN) procedure for population groups and individuals. Int Dent J. 1987 Dec;37(4):222-33. PMID: 3481626.

9. Bâ, H. , Sangaré, I. , Camara, Y. , Noumou, S. , Ousmane, D. , Kéita, M. , Mamadou, T. , Souleymane, C. , Samba, S. , Massama, K. , Thiam, D. , Boubacar, S. , Mamadou, D. , Ichaka, M. , Diall, I. , Bâ, A. , Bâ, B. and Mamourou, S. (2020) Assessment of Common Dental Indices and Need for Periodontal Treatment in the Cardiology

Outpatients Unit at the University Hospital Gabriel Touré (UH-GT) in Bamako. *World Journal of Cardiovascular Diseases*, 10, 131-143. doi: 10.4236/wjcd.2020.103014.

10. Yolov T. Periodontal condition and treatment needs (CPITN) in the Bulgarian population aged over 60 years. International dental journal. 2002 Aug;52(4):255-60.

11. Mamai-Homata E, Margaritis V, Polychronopoulou A, Oulis C, Topitsoglou V. Periodontal diseases in Greek senior citizens-risk indicators. Periodontal Diseases-A Clinician's Guide. InTech. 2012 Feb 3:231-52.

12. Artuković D, Špalj S, Knežević A, Plančak D, Pandurić V, Anić-Milošević S, Lauc T. Prevalence of periodontal diseases in Zagreb population, Croatia, 14 years ago and today. Collegium antropologicum. 2007 Apr 10;31(2):471-4.

13. Krustrup U, Erik Petersen P. Periodontal conditions in 35–44 and 65–74-year-old adults in Denmark. Acta Odontologica Scandinavica. 2006 Jan 1;64(2):65-73.

14. Schiffner U, Hoffmann T, Kerschbaum T, Micheelis W. Oral health in German children, adolescents, adults and senior citizens in 2005. Community dental health. 2009 Mar 1;26(1):18.

15. Whelton H, Crowley E, O'mullane D, Woods N, McGrath CP, Kelleher V, Guiney H, Byrtek M. Oral health of Irish adults 2000-2002.

16. Bourgeois DM, Doury J, Hescot P. Periodontal conditions in 65–74 year old adults in France, 1995. International dental journal. 1999 Jun;49(3):182-6.

17. Gamonal JA, Lopez NJ, Aranda W. Periodontal conditions and treatment needs, by CPITN, in the 35–44 and 65–74 year-old population in Santiago, Chile. International dental journal. 1998 Apr;48(2):96-103.

18. Siukosaari P, Ajwani S, Ainamo A, Wolf J, Närhi T. Periodontal health status in the elderly with different levels of education: a 5-year follow-up study. Gerodontology. 2012 Jun;29(2):e170-8.

19. Chatzopoulos GS, Tsalikis L. Periodontal treatment needs and systemic diseases in an older population in Greece. Journal of clinical and experimental dentistry. 2016 Feb;8(1):e32.

20. Chatzopoulos GS, Cisneros A, Sanchez M, Wolff LF. Systemic medical conditions and periodontal status in older individuals. Special Care in Dentistry. 2018 Nov;38(6):373-81.

21. Singh P, Kaur M, Singh I. Association of systemic and periodontal diseases: A hospital based study. International Journal of Applied Dental Sciences 2017; 3(2): 156-161

22. Singh A, Sharma RK, Tewari S, Narula SC. Correlation of tooth mobility with systemic bone mineral density and periodontal status in Indian women. Journal of Oral Science. 2012;54(2):177-82

23. Saeed Q, Memon S, Hosein M, Ahmed A, Ikram S. Correlation between glycaemic state and tooth mobility in patients with periodontal disease. JPMA. The Journal of the Pakistan Medical Association. 2021 May 1;71(5):1337-40

24. Aminoshariae A, Mackey SA, Palomo L, Kulild JC. Declassifying mobility classification. Journal of endodontics. 2020 Nov 1;46(11):1539-44

25. Glargia M, Lindhe J. Tooth mobility and periodontal disease. Journal of clinical periodontology. 1997 Nov;24(11):785-95

26. Özçaka Ö, Becerik S, Bıçakcı N, Kiyak AH. Periodontal disease and systemic diseases in an older population. Archives of gerontology and geriatrics. 2014 Sep 1;59(2):474-9

27. Akhionbare O, Ojehanon PI. A study of the effect of frequency of tooth brushing on the prevalence of inflammatory periodontal diseases. Port Harcourt Medical Journal. 2016 Sep 1;10(3):119

28. Zimmermann H, Zimmermann N, Hagenfeld D, Veile A, Kim TS, Becher H. Is frequency of tooth brushing a risk factor for periodontitis? A systematic review and meta-analysis. Community dentistry and oral epidemiology. 2015 Apr;43(2):116-27