Original Article

Periodontal Diseases in Diabetics Who Use Betel Nuts and Smoke in Bangladesh

Sarker RN[1], Akter A[2],Sazol BR[3], Paul SK[4], Kabir M[5]

Abstract

The Diabetic Clinic in Rajshahi and the Department of Preventive and Children Dentistry at Bangabandhu Sheikh Mujib Medical University (BSMMU) in Dhaka conducted a cross-sectional study from April to December 2023. Examining the role of chewing tobacco, betel nut, or both in the development of a higher periodontal index was the goal of the study. Between the ages of 19 and 79, 34 men and 47 women made up the study population. A semi-structured questionnaire was used for interviews and oral examinations to collect the data. The statistical analysis was conducted using SPSS 16.0. According to the study's findings, every participant brushed their teeth on a frequent basis. Among the targeted diabetic individuals, the study revealed an intriguing correlation between tobacco use and chewing betel nut and periodontitis. It is believed that tobacco and betel nut users may benefit diabetics' periodontal health in light of the study's link. Nevertheless, more research is advised to ascertain the effects of tobacco and betel nut in lowering blood sugar and, consequently, periodontitis in diabetics.

Key words: Periodontitis, Diabetics, Tobacco, Betel nut, Inflammation

Journal of Dentistry and Allied Science, Vol 8, No 2
Article Received: 21May 2025, Accepted: 23 Jun 2025
DOI: https://doi.org/10.3329/jdas.v8i2.85826

1. **Rathindra Nath Sarker**, SMO (SBDMMC), Dhaka University
2. **Afroza Akter**, Chief Consultant, Lucky Dental Clinic
3. **Md. Bazlur Rashid Sazol**, Research Officer, Research & Evaluation Section, ASA, Bangladesh.
4. **Suman Kumar Paul**, Assistant Professor (cc), Monowara Sikder Medical College Hospital, Modhupur, Kartikpur, Badhergonj, Shariatpur.
5. **Marzan Kabir**, MO (SBDMMC), Dhaka University.

***Corresponding Author**

Dr. Rathindra Nath Sarker, BDS, MPH, PGD in Journalism, SMO (SBDMMC), Dhaka University,
E- mail: sarkerrobin13@du.ac.bd, Cell No: +88 01716226189

Introduction

Now-a-days Diabetes Mellitus (DM) is one of the major health problems worldwide including Bangladesh. DM is a systemic disease having various complications affecting both the quality as well as the length of life. Previously there were five "Classic" complications (micro-angiopathy, neuropathy, nephropathy, micro-vascular disease, and delayed wound healing) associated with the condition especially in uncontrolled or unstable diabetes (1). Later on, periodontitis has been stated the "sixth" important diabetes consequence (2). The tissue and bone structure around the teeth are impacted by periodontitis, which is an infection of the periodontal ligaments. It usually occurs as a result of poor oral hygiene habits. If periodontitis is not identified and treated, it can cause excruciating pain and damage. (3,4) Diabetes mellitus exhibits a strong vulnerability to infections. One of the most vulnerable regions to infection is the oral cavity, and people with diabetes are more likely than those without the disease to get infections in their tongue, oral mucosa, and periodontal tissue. Due to the periodontal tissue's constant exposure to food particles, this is once more more suitable and significant. The food particles were colonized by the bacteria and formed a film of dental plaque around the tooth.Diabetics have more pronounced gingival responses to bacterial plaques. Even at a younger age than in a patient without diabetes, periodontal diseases eventually have a tendency to develop more severely. Thus, it is widely known that both type 1 and type 2 diabetes can lead to the development of chronic periodontitis. Diabetes alters the metabolism of collagen and the action of phagocytic cells, which affects several host defense and repair systems and compromises the integrity of periodontal tissues. Since the periodontal ligament is primarily made of collagen tissue and diabetics have impaired collagen metabolism, periodontal tissue is more susceptible to deterioration, particularly when diabetes is poorly managed (3). Similarly, the presence of any infection, particularly periodontitis, might exacerbate the symptoms of diabetes by making it more difficult to regulate insulin. (5) As a result, periodontitis is more than a simple dental infection. (1,2) The most prevalent oral health issue in Bangladesh is plaque-induced periodontitis, which is exacerbated in diabetics and results from poor oral hygiene care. Therefore, periodontitis has a significant cost impact and places a heavy burden on preventative measures. Therefore, it makes sense to highlight the importance of preventive dental hygiene programs, which are particularly crucial for patients with diabetes mellitus in order to get the appropriate word to the right person at the right time. (5) In order to accomplish this, it is critical to identify the variables that influence the development of periodontitis in diabetics, particularly in the context of Bangladesh, with regard to dietary practices, lifestyle choices, and other behavioral attitudes. The chance to reevaluate the roles of tobacco, betel nuts, education, socioeconomic level, family history, and blood sugar management techniques among diabetics was presented by the current study. It was crucial to determine the degree of correlation between the periodontal health statuses of diabetics and the many study parameters that were used as variables in order to conduct the study effectively. After identifying the risk factors from Bangladesh's point of view, the study's primary goal was to reform and provide new hygienic services. The study's objective was to evaluate the relationship between periodontitis and tobacco smoking and betel nut chewing in diabetic cohorts, taking into account a number of social, lifestyle, and clinical aspects. Tobacco, betel nut, blood sugar control, education, and socioeconomic position were all evaluated as factors that contribute to the development of periodontitis. The results of the study would be useful in establishing appropriate goals in which the researcher must understand the critical function that variables (used in this study) have in designing health education programs and policies.In order for the study to support and guarantee improved periodontal health care for people with diabetes by raising awareness, advocating for change, and educating people about the contributing variables.

Research objectives

To assess the prevalence and severity of periodontal diseases among diabetic patients who use betel nuts and/

or smoke in Bangladesh.

Materials and Methods

Between April and December of 2004, 81 diabetic patients who sought treatment for periodontitis in the outpatient departments of two public hospitals participated in a cross-sectional analytical study. The research was carried out in the Diabetic Clinic in the Rajshahi area as well as in the Preventive & Children Dentistry Department of the BSMMU Faculty of Dentistry. The study included 81 patients who visited the clinics during the study period.

A self-administered structured questionnaire was used to interview each participant in order to gather sociodemographic data, diabetes medication status, history of tobacco and betel nut use, and other information. Using the extra light periodontal probe created by WHO based on the CPITN index, the periodontal state was evaluated. Using defined criteria and procedures, all clinical parameters were recorded with calibration at regular intervals. As a result, the entire technique, which involved 81 patients, complies with WHO standards.

The codes were arranged in sequence from 0 to score 5 where, they represent: 0 = healthy = blue, 1 = gum bleeding on gentle probing = violet, 2 = Calculus and plaque retentive factors = cream, 3 = 4-5mm pocket = paste, 4 = 6mm or deeper pocket = deep purple to score 5 = a sextant with less than two teeth indicating tooth loss in dentate persons = pink.

Periodontal probing determines the severity of disease. A probe is like a tiny ruler that is gently inserted into pockets around teeth, deeper the pocket, severe the disease. Significant threshold was set at $p<0.05$. The gathered data were processed with the statistical program SPSS version 16.0.

Results

Table 1: Male and female participant frequencies

Sex	Frequency	Percent	Cumulative Percent
Male	34	42.0	42.0
Female	47	58.0	100.0
Total	81	100.0	

Table 1 indicates that there were 81 participants in total, of whom 34 (42%) were men and 47 (58%) were women. The participants' ages ranged from 19 to 79 years old, with a mean age of 48.62, a mode of 50, and a median age of 50.

Table 2: Frequency of reading status

Reading Status		
	Frequency	Percent
Yes	67	82.7
No	14	17.3
Total	81	100

Table 2 shows that 82.7% (62) of the population is literate, while the remaining 17.3% (14) are not. In terms of educational status, the research population's greatest score was 20% (16) who were graduates, while the second-highest score was 11.1% (9), who were illiterate. Primary school students make up the smallest percentage of the category (3.7% (3)).

According to the results, all participants brush their teeth on a regular basis, but politeness bias may cause overreporting. All did not, however, report washing their mouths before bed.

Table 3: Frequency of bed time tooth cleaning among study population

	Bed time cleaning		
Sex	Yes	No	Total
Male	17	17	34
Female	27	20	47
Total	44	37	81

Table 4: Frequency of bed time tooth cleaning in terms of literacy

Cleaning before bed			Reading status			Total
Yes	sex	Male	15	1		16
		Female	24	3		27
	Total		39	4		43
No	sex	Male	16	2		18
		Female	11	9		20
	Total		27	11		38

Table 4 shows bed time cleaning among the study subjects of different reading status as well as sex. From this table it can be depicted that the people who can read are more concerned about bed time teeth cleaning than those who are illiterate which is statically significant (P>). So, obviously education has some good impact on hygiene maintenance.

Materials using for teeth cleaning:

The majority of research participants—57% (46)—clean their teeth using a toothbrush and paste; this percentage is highest among graduates (14%) and lowest among elementary school students (3%). Interestingly, the second-highest percentage is 17.3% (14) for utilizing coal, and the users include SSC, HSC, Graduate, and even master's and doctoral holders. Eleven percent use coal, while thirty-three percent use brush among the illiterate population. The HSC group members exhibit the worst oral health in every sextant, while the graduate group members exhibit the finest.

Figure 1: Average scores across several sextants

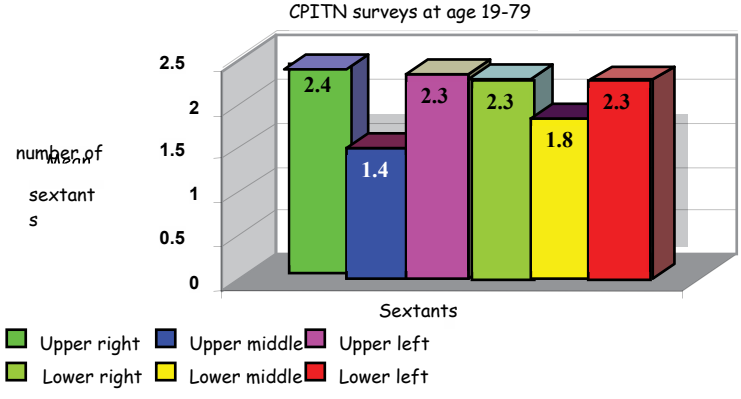
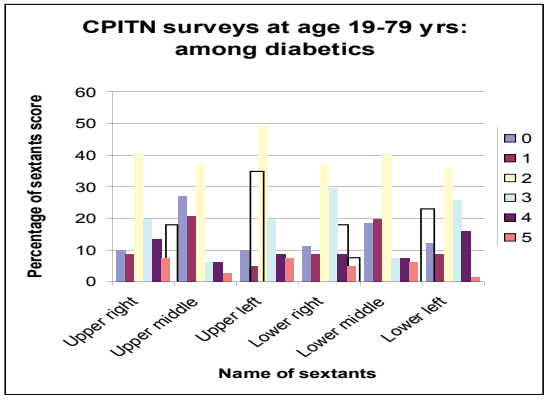


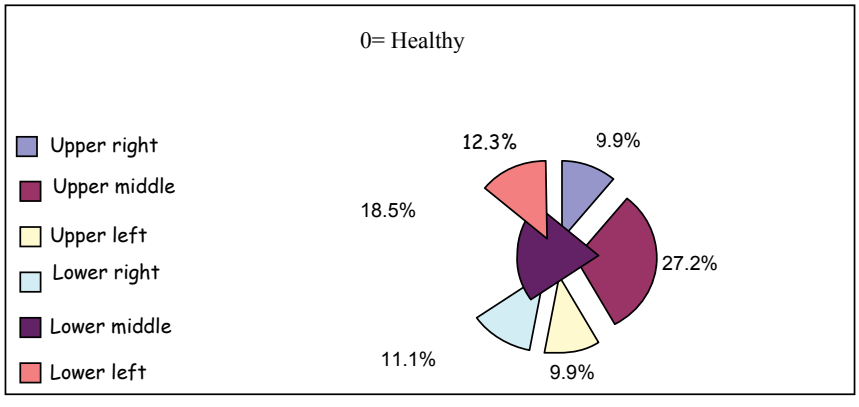
Figure 1 shows the average number of sextants by score. Out of the six sextants, the middle ones (upper = 1.4, lower = 1.8) are in better shape than the others. Additionally, the upper anterior region is healthier than the lower one of the two middle sextants.

Figure 2 shows the percentage of scores for each sextant.



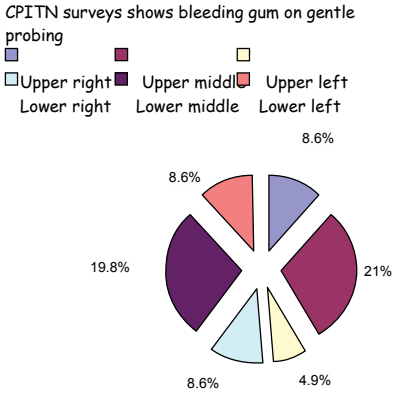
This study had a relatively low mean number of sextants that scored healthy (0 = healthy = blue) based on CPITN criteria (figure 2). One prominent feature in this study is calculus, which consistently receives the greatest score (2 = calculus = cream color) across all sextants, while missing teeth jaw has the lowest value (5 = pink = missing teeth).

Figure 3: CPITN surveys at age 19-79 years: percentage of healthy gingivae in different sextants



In healthy peiodontium, the periodontal pockets measure less than 3 millimeters and no bone loss appears (ref) on x-rays, (although this study did not take any radiograph). Gums are tight against the teeth and have pink tips. Figure 3 shows that percentage of healthy gingivae where most healthy gingivae is found in the upper middle sextant (27.2%). Lower middle sextant (18.5%) is also displaying the next better condition than that of other sextants.

Figure 4: Sextants' percentage of gum bleeding



The bleeding gum score on gentle probing is higher in the upper (21%) and lower (19.8%) anterior regions, as seen in Figure 4.

According to study evidence calculus deposition secure the highest score among all sextants. The upper left sextant shows the highest score while the 2nd highest is in both upper right and lower middle sextants. It has been found that the calculus deposition is mostly occurred in the upper posterior (both right and left) and lower middle sextants. It is reasonable to say that because of salivary ducts opens in these areas; such as parotid duct opens inside the cheek opposite the upper 1st molars and the submandibular ducts opens into the lingual side of the lower anterior teeth. So, calcium deposition is more here. As for diabetic patient, salivary secretion is reduced as well as the quality of saliva is quite thick in comparison to non-diabetics, natural wash out of the mouth cavity is hindered. As a result, the minerals contained in the saliva deposited more in these particular regions.

Figure 5: CPITN measurements of the observed calculus state at ages 19–79 years

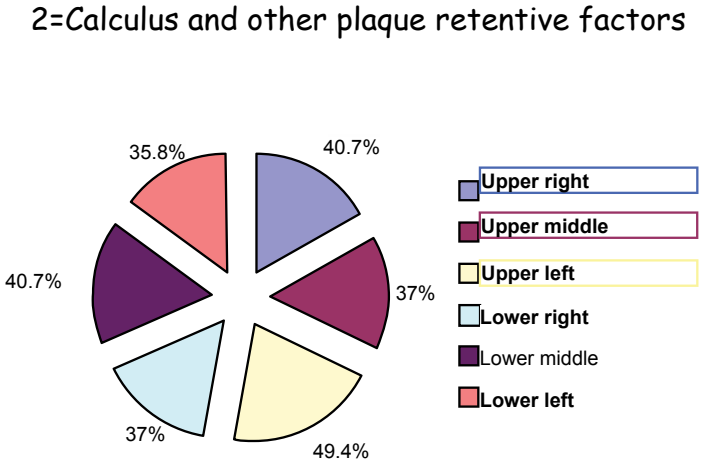
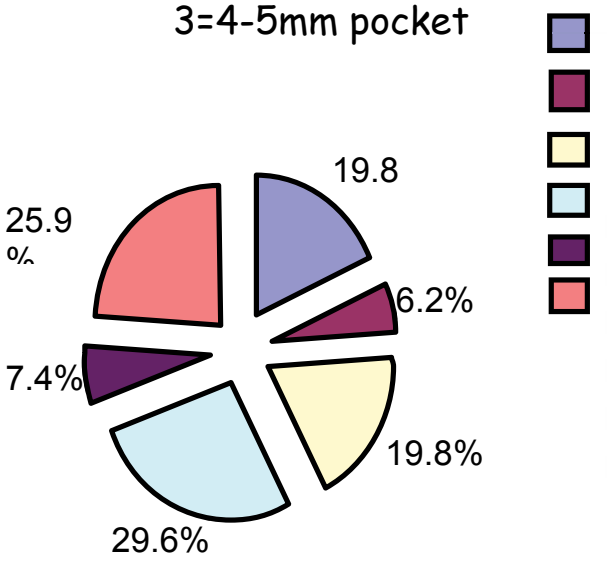
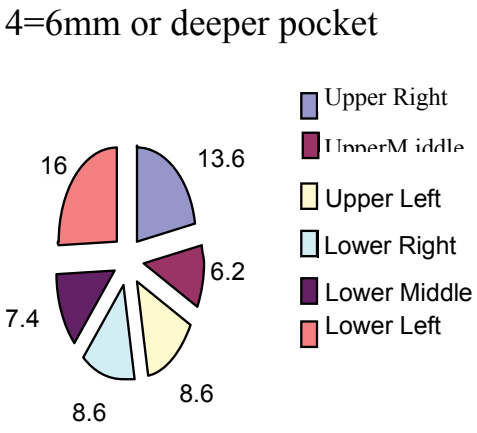


Figure 6: Pockets measuring 4-5 mm in various sextants



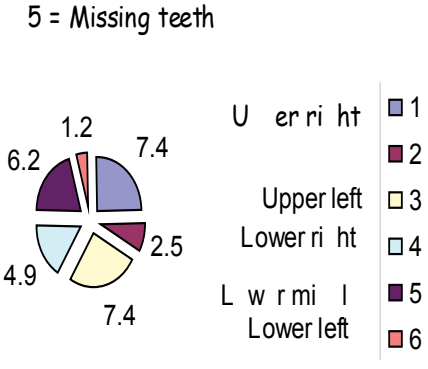
Gingival pocket is the measuring indicator of gum disease status. When the pocket measures more than 3 millimeters to 5 millimeters it indicates sign of disease. Figure 6 displaying 4-5 mm pocket most in the lower posterior sextants (both right=29.6% and left=25.9%) whereas in the middle sextants both for upper (6.2%) and lower (7.4%) is very few.

Figure 7: Worse condition of periodontium (6mm or deeper).



A significant problem is indicated by a pocket that is 6 mm or deeper (Figure 7); this is typically accompanied by receding gums and a greater degree of bone loss. In this case, the top posterior sextants score nearly twice as high as the intermediate sextants. Once more, it has been found that, in comparison to the lower one and others, the upper middle sextant is continuously in the best health.

Figure 8: Missing tooth frequency across several sextants



As shown in Figure 8, a sextant has less than two teeth in the jaw, with the lowest number (1.2) seen in the lower left sextant and the largest number in the upper right (7.4) and upper left (7.4) sextants.

Table 5: the distribution of betel nut chewer and tobacco users

Betel nut chewer				
Tobacco User	Yes	Yes	No	Total
		10	10	20
	No	18	43	61
	Total	28	53	81

The distribution of tobacco and betel nut chewers among the diabetes population is displayed in Table 5. Ten of the individuals use both tobacco and betel nut products, while forty-three do not chew any of these products. Of the remaining 28, 18 only chew betel nuts, and 10 only use tobacco. Nine men and eleven women make up the total of

twenty tobacco users, including those who use smokeless tobacco, and twenty-five men and thirty-six women make up the total of sixty-one non-tobacco users.

Table 6: Frequency of diabetes control status with sex

Sex			
Control diabetes	Male	Female	Total
Yes	29	38	67(83%)
No	5	9	14(17%)
Total	34	47	81(100%)

About 83% (67) of diabetics are worried about controlling their blood sugar, according to Table 6.

Table 7 Maintenance system of blood sugar

Blood Sugar Maintenance Status	Frequency	Percent	Cumulative Percent
0=Nothing	2	2.5	2.5
1= Insulin	15	18.5	21.0
2 = Tablet	21	25.9	46.9
3 = Diet	2	2.5	49.4
4 = Exercise	1	1.2	50.6
5=Combination	40	49.4	100.0
Total	81	100.0	

Table 7 shows that the combination therapy (tablet + diet + exercise) is used more frequently by the diabetic cohorts (49.4%; 40) to regulate blood sugar levels. Insulin users make up 18.5% of the population (15).

Table 8: The method of controlling blood sugar among tobacco and betel nut chewers

Blood sugar maintenance method among Tobacco and Betel Nut chewers					
Betel Nut Yes No			Tobacco		Total
Yes	Blood sugar maintenance method	Nothing	1	0	1
		Insulin	0	4	4
		Tablet	2	4	6
		Diet	1	1	2
		Exercise	0	1	1
		Combination	6	8	14
	Total		10	18	28
NO	Blood sugar maintenance	Nothing	0	1	1
		Insulin	1	10	11
		Tablet	1	14	15
		Combination	8	18	26
	Total		10	43	53

Surprisingly, it is detected that gum bleeding is totally absent among the betel nut chewers who are not taking insulin to control their blood sugar. On the other hand, 9% of study population who has gum bleeding need to take insulin but they are not betel nut chewer. Again, calculus score is 7 times more among the non-betel nut chewers who are taking insulin than those of betel nut chewer and insulin users. Moderate to sever pocket formation is also more frequent (13) among non-betel nut chewer than the betel nut chewer (8) who takes insulin. Only in case of missing teeth in the jaw is more common among betel nut chewer than the non betel nut chewers who are insulin dependent.

Apart from this, it has been found that among all tobacco users (20), 6 (30%) need to take insulin whereas among 61 non-tobacco users 14 (23%) are taking insulin.

Surprising that gum bleeding is totally absent in case of tobacco users who do not need to take insulin. Among 15 insulin-dependent patients only 1 are tobacco users again among 15 insulin-dependent only 4 are betel nut chewers.

Given that blood sugar levels are greater in diabetics, insulin is likely needed to regulate blood sugar levels. Notably, the individuals in this study who chew betel nut and smoke tobacco are not insulin-dependent, with the exception of a very small percentage. Does this result suggest a connection between smoke and betel nut in terms of lowering blood sugar?

Discussion & Conclusion

The current study was a cross-sectional study conducted at a hospital on diabetic individuals aged 19 to 79. This study was carried out to assess the effects of tobacco and betel nut on diabetics' periodontal health in the context of Bangladesh, along with other study criteria. Nonetheless, the middle sextants' periodontal health regularly shows better condition than the posterior sextants. From this perspective, it may be inferred that pocket formation is uncommon in the middle sextants, most likely because the anterior region is easier to clean and has greater oxygen exposure.

In contrast, the posterior sextants are difficult to clean, particularly the lower jaw, which is a dependent portion and may accumulate more food. It is also less exposed to air. They are therefore more suited for feeding bacteria and are hence more susceptible to the creation of pockets.

It is nearly universally acknowledged that tobacco and betel nut use negatively impacts dental health, even in those without diabetes, but little is known about the effects of these substances on diabetics. (6)

However, compared to a person without diabetes, a diabetic who smokes, chews betel nut, or both is at a significantly higher risk of developing periodontal disease. (source). Another study's results support the notion that smoking tobacco is a risk factor for developing periodontitis (7,8).

This study provides a contrast in terms of periodontal health, despite recent evidence supporting tobacco's significance as a powerful risk factor for edentulous mouths, or mouths with less than two teeth.

The current investigation found that both tobacco users who are not using insulin and betel nut chewers completely do not experience gum bleeding. Once more, the calculus scores of non-betel nut chewers and non-tobacco users who are taking insulin are much higher than those of betel nut chewers, tobacco users, and non-insulin users.

Nonetheless, the present study's findings indicates that betel nut and nicotine may assist diabetic individuals manage their blood sugar levels. Another study confirmed that tobacco use improves diabetics' periodontal health (9).

There, however, it is unclear how consuming betel nuts affects periodontal tissues (10). On the other hand, it has also been noted that betel nuts have antibacterial qualities and can inhibit salivary microbes in long-term users. In traditional Indian medicine, betel nut was also

used to heal bleeding gums (11,12). Therefore, it is necessary to identify the correlation between tobacco use and betel nut eating habits and a higher periodontal index. Data must be evaluated carefully because the study's sample size was small (81) and not representative. A longitudinal study would therefore be a reasonable choice to validate these findings and provide a more tangible explanation of this view.

The basic fact that maintaining good periodontal health requires having the teeth thoroughly cleaned. You must practice careful dental hygiene at home. Despite the possibility of overreporting, all study participants routinely rinse their mouths. (13,14,15,16) Although it wasn't done in this study, participant observation might be used to provide more reliable data about routine dental cleaning.Professional teeth cleaning twice a year is frequently advised for people with periodontitis in order to prevent additional damage. (17)

Reference

1. Ainamo, J., Barmes, D., Beagrie, G., Curtress, T., Martin, J., and Sardo-Infirri, J. Development of the World Health Organization (WHO) Community Periodontal Index of Treatment Needs (CPITN). Int. Dent. J. 32, 281, September, 1982

2. Tomar, SL. And Asma. S. Smoking-attributable periodontitis in Findings from NHANES III. J. Perio. 2000; 71:742-750

3. Salvi, GE, et al. Influence of risk factors on the pathogenesis of periodontitis. Periodontol 2000, 1997;14:173-201

4. Zambon,JJ, et al. Cigarette smoking increases the risk for subgingival infection with periodontal pathogens. J. Periodontol. 1996;67(suppl.):1050-1054

5. Stein SH, *Wendell KJ*, *Pabst M*, *Scarbecz M*. College of Dentistry, Periodontology Department, University of Tennessee, USA.2945 Gingival Crevicular Fluid from Smoking and Non-Smoking Chronic Periodontitis PatientsPeriodontal Disease Information, Spindler Periodontic Specialists. Periodontal Disease (http:// spindler perio.com/1V124 html)www.ncbi.nlm.nih.gov/pubmed/16895007

6. *Giannobile* WV. *Host-response therapeutics for periodontal diseases*. J Periodontol. 2008 Aug;79(8 Suppl):1592-600. Review. PubMed PMID: 18673015; PubMed

7. Anthony M. Iacopino.*Periodontitis and Diabetes Interrelationships*: *Role of Inflammation* Annals of Periodontology December 2001, Vol. 6, No. 1: 125-137

8. Anonymous. Diabetic Periodontitis: possible lipid-induced defect in tissue repair through alteration of macrophage phenotype and function lacopino. AM Oral Dis. 1995 Dec; 1(4): 214-29

9. E LallaA murine model of accelerated *periodontal* disease in *Diabetes is a risk factor for periodontal disease in humans*. *J Periodontal Res*. *1998 Oct*;*33*(*7*):*387-99*.

10.Garofalo G. S. Rapporti tra il diabete mellito e la malattia ...Lalla E, Lamster IB, Feit M, Huang L, Schmidt AM. A murine model of accelerated periodontal ...

www.tesionline.com/__PDF/25252/25252b.pdf

11. Anonymous. Treatment of Periodontal disease and control of diabetes: an assessment of the evidence and need for future research. Ann Periodontol.2001 Dec; 6(1):138-45

12. Persson Lena. Bergstorm Jan, Ito Hirosh; and Gustafsson Anders. Tobacco Smoking and Neutrophil Activity in Patients with Periodontal Disease. J Periodontol 2001; 72:90-95

13. Academic Report: Epidemiology o Perodontal Diseases. J Periodontaol. August 2005;76(8):1411-3 (www.smokersgums.com)

14. Zambon,JJ, et al. Cigarette smoking increases the risk for subgingival infection with periodontal pathogens. J. Periodontol. 1996;67(suppl.):1050-1054.

15. Salvi, GE, et al. Influence of risk factors on the pathogenisis of periodontitis. Periodontol 2000, 1997;14:173-201.

16. Gelskey, SC. Cigarette smoking and periodontitis: Methodology to assess the strength of evidence in support of a causal association. Community Dent. Oral Epidemiol. 1999;27:16-24.

17. Profiling gingival crevicular fluid from smoking and non-smoking ...by SH Stein - 2006Research Support, *N.I.H.*, Extramural; Research Support, Non-U.S. *Gov*'t ... DE11519/DE/NIDCR *NIH* HHS/United States. PMID: *16895007*[*PubMed* - indexed for *...www.ncbi.nlm.nih.gov/pubmed/16895007*