

A study of the effect of frequency of tooth brushing on the prevalence of inflammatory periodontal diseases

Osagie Akhionbare, Patrick I. Ojehanon

Department of Periodontics, School of Dentistry, University of Benin, Benin, Nigeria

Abstract

Background: The use toothbrush and paste are the most common means of oral prophylaxis in Nigeria and how the frequency of this prophylaxis affects the prevalence of periodontal disease has not been fully ascertained.

Aim: This study aims to assess if frequency of self-oral hygiene prophylaxis in a day, using the toothbrush and paste, had any relationship on the prevalence of inflammatory periodontal diseases, using the community periodontal index of treatment needs (CPITN).

Methods: A cross-sectional study of 894 subjects (428 males and 466 females), who reported for the first time at the Dental Centre, of the University of Benin Teaching Hospital, Benin City, Nigeria, were examined. Only those that used toothbrush and paste once or twice daily, as the only oral hygiene method and were 18 years and above of age, were selected and investigated.

Results: 58.3% of the entire subjects surveyed and 63.1% of male subjects indicated twice-daily oral prophylaxis when compared to 53.9% of female subjects. There was a statistical significant difference in the distribution of subjects with respect to occupation, between the two groups. This difference was most marked among the professional subgroup as compared to other subgroups. There was a statistical significant difference in the prevalence of periodontal diseases as indicated by CPITN scores. The group that performed oral prophylaxis twice daily had a higher proportion of those with CPITN codes 0 and 1 whereas codes 3 and 4 were more predominant with the group that perform oral prophylaxis once daily.

Conclusion: The distribution of CPITN scores had a relationship with the frequency of daily oral hygiene practices. In view of the results of this study, it is suggested that some form of preventive oral hygiene programs be embarked on where emphasis is placed on regular and higher frequency of tooth brushing.

Keywords: Tooth brushing, frequency, prevalence, periodontal diseases

Address for correspondence:

Dr. Osagie Akhionbare, Department of Periodontics, School of Dentistry, University of Benin, Benin, Nigeria. E-mail: osagie.akhionbare@uniben.edu

Received: 05.09.2016, **Accepted:** 14.09.2016

Introduction

Poor oral hygiene habits have been reported in various studies as having a relationship with the prevalence of inflammatory periodontal diseases.^{1,2} Gingivitis, in most cases is predominately the first symptom and the most reliable indicator of this disease

condition. Prevention of the development and progression of periodontal disease is greatly related to the maintenance of healthy gingival through proper oral hygiene habits and regular professional dental care. Therefore, irregular or inadequate tooth brushing program, results in plaque accumulation, which

Access this article online	
Quick Response Code:	Website: www.phmj.org
	DOI: 10.4103/0795-3038.197750

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Akhionbare O, Ojehanon PI. A study of the effect of frequency of tooth brushing on the prevalence of inflammatory periodontal diseases. Port Harcourt Med J 2016;10:119-23.

have been associated with gingival inflammation that may progress to periodontitis.²⁻⁴ This has been reported, as one of the major sources of tooth loss.⁵

The use of a plastic toothbrush with dentifrice, as a means of oral hygiene habit has been reported to reduce the prevalence of inflammatory periodontal diseases.⁶⁻⁸

The plastic toothbrush with paste is the most common oral hygiene habits practiced by individuals, mostly in middle and high socioeconomic homes⁹ and among urban residents as compared with rural residents.^{10,11}

Other oral hygiene methods such as chewing sticks, charcoal, salt and ground porcelain have been used in different cultures mainly by the low socioeconomic homes.¹¹⁻¹³

Socioeconomic factors have been associated with oral hygiene status. Subjects from high and medium socioeconomic groups have been reported to have a better oral hygiene status when compared with those on low socioeconomic standing.^{14,15}

Some studies have indicated that male oral health status, attitude and behaviour are poorer as compared to females,^{16,17} because males have been reported to perform oral hygiene habits less frequently than females.^{18,19} This is because among the female population, students have been reported to be more conscious about their dental health.^{20,21}

It has also been reported that women consult dental services much more frequently than men do.

This is because of their desire to conserve their teeth while men have been observed to prefer extractions.¹⁸

Conflicting findings have been reported about the influence of frequency of tooth brushing habit and the presence of plaque, which has been associated with gingivitis.

Some studies had indicated that lower frequency of tooth brushing was associated with increased presence of plaque, gingival inflammation and periodontal pockets^{21,22} while others have reported contrary findings. Higher frequency of tooth brushing has also been related to regular dental visits, dental care during school years and high level of education.²³

However, not much study has been undertaken to ascertain if the frequency of tooth brushing in a day had any influence on the prevalence of periodontal diseases.

Therefore, the aim of this study was to determine if the frequency of oral hygiene habits in a day, with the use of a plastic toothbrush with paste at a rate of once or twice

daily, had any relationship on the prevalence of inflammatory periodontal diseases, using the community periodontal index of treatment needs (CPITN) as the index method.²⁴

Methods

A cross-sectional study with a total of 894 subjects, made up 428 male and 466 female, who reported for the first time at the Dental Centre, of the University of Benin Teaching Hospital, Benin City, Nigeria, was selected by a consecutive sampling method and examined. It involved only subjects who came for routine oral prophylaxis for the removal of plaque and calculus and had no other oral and systemic abnormalities.

As part of the inclusion criteria, only subjects who gave their consent, used toothbrush with paste once or twice daily, as the only oral hygiene method, were 18 years and above of age, were investigated.

The authors who are qualified periodontologist, after due calibration of themselves as outlined by Cutress *et al.*,²⁴ first administered questionnaire to each subject. This was to ascertain their age, gender and socioeconomic status. Where the patients were not sufficiently literate or had difficulty with completing the questionnaires, the authors provided assistance.

The CPITN examinations, were carried out using the methods as outlined by Cutress *et al.*²⁴

Data interpretation and analysis

All the data were collected, edited and summarised by the authors.

The independent variable in this study was the frequency of tooth brushing with paste whereas the dependent variable was the periodontal treatment needs as indicated by the CPITN codes.

Chi-square analysis was used as the test statistic for detecting associations between the dependent variables. The alpha level was set at 0.05.

Statistical analysis was carried out using EpiInfo version 6 statistical package (Epi Info is public domain statistical software for epidemiology developed by the Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia (USA)).

Results

A total of 894 were examined in this survey, made up of 428 males and 466 females.

A higher proportion (58.3%) of the entire subjects surveyed, indicated twice (2×) daily use of a toothbrush with paste as a

means of prophylaxis, while the others indicated once daily. The male population had a higher proportion (63.1%) of those that indicated the twice (2X) daily use of a toothbrush with paste as a means of prophylaxis when compared to female (53.9%) population [Table 1].

There was a statistical significant difference in the distribution of subjects with respect to occupation, between those that perform oral prophylaxis once and twice daily. The difference in frequency of tooth brushing was most marked among the professional subgroup as compared to other subgroups. While a high proportion (20.5%) of the subjects that perform oral prophylaxis twice daily were professionals, only 5.1% of the subjects that perform oral prophylaxis once daily were professionals. The reverse was the case with distribution among the skilled, partly skilled and unskilled subgroups. In these subgroups, slightly higher proportion of subjects performs oral prophylaxis once daily [Table 2].

There was a statistical significant difference in the prevalence of periodontal disease as indicated by CPITN scores between those that perform oral prophylaxis on the basis of once and twice daily. Those who performed oral prophylaxis twice daily had a higher proportion of those with healthy and bleeding periodontium, i.e. CPITN codes 0 and 1, respectively. The difference in the prevalence of periodontal pockets (CPITN codes 3 and 4) was more predominant among those that perform oral prophylaxis once daily [Table 3].

Discussion

A greater proportion of the entire subjects (58.3%) in this study, perform oral prophylaxis by brushing their teeth with

toothbrush and paste twice daily when compared to the remaining that brushes once daily (41.7%). This greater proportion can be attributed to the fact that most subjects involved in this survey reside in the urban area where the data collection centre is located. This location is the capital of the state that has a relatively high concentration of educational institutions and other socioeconomic establishments. This factor of location could also be responsible for most of the subjects (71.0%) in this study belonging to the middle and high socioeconomic class (skilled, intermediate and professionals).

It is important to note that previous studies, have reported that socioeconomic factors have relationships with oral hygiene habits.¹¹⁻¹⁴

The results of this study have indicated that the male population had a higher proportion of those that brushes twice daily as compared to the female population. This is similar to a study where knowledge and awareness about dental health and disease conditions better in male subjects than in females.²⁵ However, this is a reversal from other studies, where females were reported to have a higher proportion of those that have a higher frequency of tooth brushing than males.^{3,14,17-20} This could be attributed to the culture of the people where pre-eminence is placed on the education of the male child.

The professional subgroup had the highest proportion of those that use the toothbrush with paste, twice per day as a means of prophylaxis as compared to the other subgroups.

This study further corroborates report from previous studies of the relationship between socioeconomic status with the level of education inclusive and the frequency of daily tooth brushing. That the higher the level of education, which is a key factor in socioeconomic status, the higher the frequency of tooth brushing.²⁴

This study has indicated that the frequency of tooth brushing in a day has a relationship with the prevalence of inflammatory

Table 1: Distribution of gender according to frequency of tooth brushing

Frequency of tooth brushing	Total (%)	Male (%)	Female (%)
Once daily (1x)	373 (41.7)	158 (36.9)	215 (46.1)
Twice daily (2x)	521 (58.3)	270 (63.1)	251 (53.9)
Total	894 (100)	428 (100)	466 (100)

Table 2: Distribution of occupation according to frequency of tooth brushing

Frequency of tooth brushing	Total number of subjects	Occupation (%)				
		Professional	Intermediate	Skilled	Partly skilled	Unskilled
Once daily	373 (100)	19 (5.1)	66 (17.7)	157 (42.1)	94 (25.2)	37 (9.9)
Twice daily	521 (100)	107 (20.5)	72 (13.8)	213 (40.9)	86 (16.5)	43 (8.3)
Total	894 (100)	126 (14.0)	138 (15.4)	370 (41.4)	180 (20.2)	80 (9.0)

$\chi^2=47.81$; $df=4$; $P<0.05$ (significant)

Table 3: Distribution of community periodontal index of treatment needs scores according to frequency of tooth brushing

Frequency of tooth brushing	Total number of subjects (%)	CPITN score (%)				
		0	1	2	3	4
Once daily	373 (100)	7 (1.9)	31 (8.4)	262 (70.2)	68 (18.2)	5 (1.3)
Twice daily	521 (100)	24 (4.6)	54 (10.4)	378 (72.6)	58 (11.1)	7 (1.3)
Total	894 (100)	31 (3.5)	85 (9.5)	640 (71.6)	126 (14.1)	12 (1.3)

$\chi^2=13.57$; $df=4$; $P=0.05$ (significant). CPITN: Community periodontal index of treatment needs

Downloaded from http://journals.lww.com/pmhj by BHD/MSF/PHKAV/ZEUM/1QIN/4+KLLH/EZP/SI/H04XMI0H/CYWCX1AW nYOp/IIQH/D3/3D00ODR/VTvSF14C/3VC1y0abogvQZxdm/KZBYtws= on 09/23/2024

periodontal diseases as indicated by CPITN scores. The group of subjects that brushes twice daily, had a higher proportion of subjects with CPITN codes 1 and 2, that do not need professional intervention and those that need continuous proper self oral hygiene practice (TN = 0 and TN = 1 respectively) than the group that brushes once daily. This is illustrated by the statistical significant difference ($P < 0.05$) in the distribution of CPITN scores between the two groups. Similar studies have reported that lower frequency of tooth brushing was associated with the increased presence of plaque, gingival inflammation and periodontal pockets. That the higher the frequency of tooth brushing, the lower the tendency for plaque accumulation.^{22,23} Therefore, the lower the rate of plaque formation and its accumulation, the lower the tendency for gingival inflammations which are associated with the formation of periodontal pockets and loss of teeth.

Limitations

- This study considered only subjects of 18 years of age and above, while those below this age limit, that do use plastic toothbrush and paste as oral hygiene habits were not included in this study
- Majority of the subjects who reported for the first time at the Dental Centre that met the inclusion criteria belong to a high socioeconomic class, i.e., spanned from skilled to professional subjects.

Conclusion

This study has indicated that the frequency of tooth brushing in a day has a relationship with the prevalence of inflammatory periodontal diseases as indicated by CPITN scores. The group of subjects that brushes twice daily, had a higher proportion of subjects with CPITN codes 0, 1 and 2, that do not need professional intervention than the group that brushes once daily.

The frequency of oral hygiene practices in turn had a bearing on the educational level of the study population. When the educational level of the study group decreased, the prevalence of periodontal conditions that demand professional intervention increases.

In view of the results of our study, it is suggested that some form of preventive oral hygiene programs be embarked on where emphasis is placed on regular and higher frequency of tooth brushing.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. al-Banyan RA, Echeverri EA, Narendran S, Keene HJ. Oral health survey of 5-12-year-old children of National Guard employees in Riyadh, Saudi Arabia. *Int J Paediatr Dent* 2000;10:39-45.
2. Sayegh A, Dini EL, Holt RD, Bedi R. Oral health, sociodemographic factors, dietary and oral hygiene practices in Jordanian children. *J Dent* 2005;33:379-88.
3. Taani DS, al-Wahadni AM, al-Omari M. The effect of frequency of toothbrushing on oral health of 14-16 year olds. *J Ir Dent Assoc* 2003;49:15-20.
4. Machuca G, Khoshfeiz O, Lacalle JR, Machuca C, Bullón P. The influence of general health and socio-cultural variables on the periodontal condition of pregnant women. *J Periodontol* 1999;70:779-85.
5. Odusanya SA. Tooth loss among Nigerians: Causes and pattern of mortality. *Int J Oral Maxillofac Surg* 1987;16:184-9.
6. Madden IM, Newman H, Hall C, Brading MG, Ketkar V, Bidinger PD. Sustained oral health improvement and use of toothbrushes and dentifrice by previous users of traditional materials in a rural population in Andhra Pradesh, India. *Int Dent J* 2004;54(5 Suppl 1):315-20.
7. Sgan-Cohen HD, Vered Y. Plaque removal and oral health promotion potential for the elmex interX medium toothbrush: Clinical efficacy and safety evaluation. *J Clin Dent* 2003;14:70-3.
8. Sharma NC, Qaqish JG, Galustians HJ, King DW, Low MA, Jacobs DM, *et al.* A 3-month comparative investigation of the safety and efficacy of a new toothbrush: Results from two independent clinical studies. *Am J Dent* 2000;13:27A-32A.
9. Carvalho JC, Van Nieuwenhuysen JP, D'Hoore W. Oral hygiene and gingival condition among 12-year-old children in the Brussels Region. *Rev Belge Med Dent* 2001;56:281-90.
10. Addo-Yobo C, Williams SA, Curzon ME. Oral hygiene practices, oral cleanliness and periodontal treatment needs in 12-year old urban and rural school children in Ghana. *Community Dent Health* 1991;8:155-62.
11. Sofola OO, Shaba OP, Jeboda SO. Oral hygiene and periodontal treatment needs of urban school children compared with that of rural school children in Lagos State, Nigeria. *Odontostomatol Trop* 2003;26:25-9.
12. Yalcin F, Eskinazi E, Soydinc M, Basegmez C, Issever H, Isik G, *et al.* The effect of sociocultural status on periodontal conditions in pregnancy. *J Periodontol* 2002;73:178-82.
13. Al-Otaibi M, Angmar-Månsson B. Oral hygiene habits and oral health awareness among urban Saudi Arabians. *Oral Health Prev Dent* 2004;2:389-96.
14. Villalobos-Rodelo JJ, Medina-Solis CE, Maupomé G, Vallejos-Sánchez AA, Lau-Rojo L, de León-Viedas MV. Socioeconomic and sociodemographic variables associated with oral hygiene status in Mexican schoolchildren aged 6 to 12 years. *J Periodontol* 2007;78:816-22.
15. Taani DQ. Relationship of socioeconomic background to oral hygiene, gingival status, and dental caries in children. *Quintessence Int* 2002;33:195-8.
16. Udoye CI. Oral health attitudes and behaviour among patients in a tertiary hospital. *Odontostomatol Trop* 2006;29:19-22.
17. Al-Shammari KF, Al-Ansari JM, Al-Khabbaz AK, Dashti A, Honkala EJ. Self-reported oral hygiene habits and oral health problems of Kuwaiti adults. *Med Princ Pract* 2007;16:15-21.
18. Bengondo C, Ngoa S, Bengono G. The need for awareness oriented towards dental care in Yaounde. *Odontostomatol Trop* 2001;24:38-40.
19. Darout IA, Astrøm AN, Skaug N. Knowledge and behaviour related to oral health among secondary school students in Khartoum Province, Sudan. *Int Dent J* 2005;55:224-30.
20. Bou C, Miquel JL, Poisson P. Oral health status of 1500 university students in Toulouse France. *Odontostomatol Trop* 2006;29:29-33.
21. Masalu J, Mtaya M, Astrom AN. Risk awareness, exposure to oral health information, oral health related beliefs and behaviours among students attending higher learning institutions in Dar es Salaam, Tanzania. *East Afr Med J* 2002;79:328-33.
22. Nobile CG, Fortunato L, Pavia M, Angeillo IF. Oral health status of male

- prisoners in Italy. *Int Dent J* 2007;57:27-35.
23. Christensen LB, Petersen PE, Krstrup U, Kjølner M. Self-reported oral hygiene practices among adults in Denmark. *Community Dent Health* 2003;20:229-35.
24. 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;37:222-33.
25. Almas K, Albaker A, Felemban N. Knowledge of dental health and diseases among dental patients, a multicentre study in Saudi Arabia. *Indian J Dent Res* 2000;11:145-55.