

# Pattern of Dental Plaque Distribution and Cigarette Smoking: A Cross sectional Study

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## ABSTRACT

**Objective:** To measure the incidence rate with distribution of dental plaque intraorally and its relationship with cigarette smoking habits in Pakistan population.

**Study Design:** Descriptive / cross-sectional study

**Place and Duration of Study:** This study was conducted at the Liaquat College of Medicine and Dentistry (L.C.M.D), Karachi from March 2017 to June 2017.

**Material and Methods:** The study population involved 388 adult individuals check up for free dental examination in a medical and dental camp arranged by Liaquat College of Medicine and Dentistry (L.C.M.D). Individuals who came to the Out Patient Department (OPD) were 425. In those 388 people (91%) were contributed in this study. A total of eight different sites of dentition were examined for the presence of dental plaque accumulation in each individual (3104 sites). Demographic and behavioural information including several dimensions of smoking habits was collected by questionnaire.

Main outcome measures: we did consecutive sampling for collecting data and individuals were allocated into groups on the basis of their smoking status (103 cigarette smokers and 285 non cigarette smokers), the dental plaque accumulated sites were examined by risk factors for example smoking habit, cigarette smoking /years, number and cigarettes' type/day.

**Results:** Smoking was considerably related with accumulation of dental plaque, predominantly significant in cigarette smokers on the lower anterior lingual tooth surface and in non cigarette smokers on upper buccal surface was highly affected.

**Conclusion:** More number of dental plaque accumulated sites was found in relation to the degree, duration of smoking and type of cigarettes.

**Key Words:** Dental Plaque Accumulation, Smoking Habit, Intra-Oral Distribution

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## INTRODUCTION

“Dental plaque is considered to be a complex, metabolically interconnected, highly organized bacterial system consisting of dense masses of microorganisms, streptococci similar to streptococcus mutans, fixed in an inter-microbial matrix. A thin layer of fenestrated pellicle, which is an organic bacteria free film, deposits on the tooth surfaces within two hours after the teeth are brushed”<sup>1-2</sup>. The outcome of several researches have without fail recommended “a

strong relationship between soft plaque and dental caries, gingivitis and periodontitis”<sup>1,3,10</sup>.

The outcomes of previous researches “suggest that apart from genetic and constitutional factors, tobacco plays a pivotal role in the occurrence of dental plaque accumulation association with periodontal diseases in different population”<sup>4,6,18</sup>

several researcher has explored “the distribution of dental plaque in human associated with smoking”<sup>6, 15</sup>. Although some have come across keen on the association among the cigarettes numbers and plaque buildup<sup>7,8,13</sup>. To the best of our facts, “the potentially influential role of the type of cigarettes smoked has not been investigated. Furthermore, the association is the above mentioned factors with distribution of plaque pattern are still a question mark for researchers”<sup>9, 10</sup>.

The endeavor of this research were to look up the relationship between selected scale of contact to cigarette smoking and dental plaque build up and to examine the intra oral sharing of dental plaque pattern according to smoking status in a young adult population of subjects attending a free dental camp in Gulshan e Iqbal for free dental examination.

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## MATERIALS AND METHODS

**Participant Selection:** Gulshan e Iqbal is one of the towns in Karachi. Community Dentistry department from L.C.M.D arranged a free dental camp in LCMD hospital. Darul Sehat hospital covers the huge residents of Gulshan e Iqbal. Chosen individuals were healthy. They tooth brush two times in a day. All applicants had full arch teeth present. Individual's age was between 18 - 35 years old. A consecutive sampling method was accepted out to.

**Consent:** The department of research and ethics of Liaquat College of Medicine & Dentistry Karachi, Pakistan approved this study. Written Consent forms were obtained by each participant before included in the study. All participants were informed about the purpose and extent of the study. Written concern forms were filled with signature of the selected participants before collecting

**Data Collection:** After satisfying with signing consent forms, data was together by questionnaire from each participant. Questionnaire included age, gender, cigarette smoking habit, duration, type, reason and past history and methods how they maintaining of oral health. Cigarette Smoking was there in the C.S while N.S did not smoking cigarette<sup>11, 22, 27</sup>.

An experienced dental surgeon who standardized carried out all the assessments. It's a double blind study so no one know about hypothesis. Dentition was alienated into eight divisions lower labial, buccal, lingual anterior and lingual posterior, similarly in upper too. There were only 388 persons including 103 C.S and 285 N.C.S who were inspected in this research. There were 3104 area were inspected in cigarette smokers. We inspected each selected area to recognize dental plaque deposition. Our criteria that dental plaque should be present more than two third of the crown we nominated present. On the other hand we nominated No<sup>19, 24, 26</sup>.

**Statistical Analysis:** With the help of SPSS ver. 21.0 we did statistical analysis. Quantitative variable for example age, quantity of cigarette were showed in mean. For analyzing between C.S with N.C.S we were used Chi Square. P-values  $\neq < 0.5$  were noticeably important.

**Inclusion & Exclusion Criteria:** Health adult will be considered in inclusive criteria those have no clinical sign and symptom of any systemic disease with no history of betel nut and pan etc. A standardised methods of choice of individuals in importance of maintenance of oral health was having habit of tooth brushing two times in a day<sup>17, 23-25</sup>.

Individuals having history and sign of systemic disease for example diabetic etc and history of Periodontitis were not including in this research. Individuals had history of radiation or had clinical signs of Oral Cancer were not include in this research.

Out of 425 only 388 full fill the criteria and include in this research.

**Ethical Considerations:** Written informed consent was given by each individual with research was accepted by the Department of Research and Ethics.

## RESULTS

In this study total 103 C.Ss and 285 N.C.Ss were used. In those participant we analysed 3,104 areas were inspected for dental plaque. There were 53 areas in C.S and 48 areas affected in N.C.S.

**Dental plaque distribution in oral cavity as per cigarette smoking habit:** In C.S, dental plaque deposition were mostly establish in the lower lingual anterior site, although in N.C.S dental plaque was more common in the upper buccal area. (Table 1).

**Dental plaque distribution in oral cavity as per cigarette smoking duration:** The highest numbers area in which we observed dental plaque build up in C.S more than fourteen years habit of smoking. The occurrence of dental plaque growth was secondly for persons who had cigarette smoked 10 - 14 years. The occurrence of dental plaque accretion was similar for individuals who had smoked between 5 to 9 years and for those who had smoked less than 5 years. We conclude that duration and plaque deposition is directly proportion to each other ( $\chi^2=17.64$ ,  $p<0.001$ ). (Table 2).

**Dental plaque distribution in oral cavity as per number of cigarettes smoked each day:** Individuals exposure to smoke minimum 10 cigarettes or less in each day were as a mild smokers. Individual's mentioned 10 cigarette or more per day were measured to be heavy smokers<sup>23</sup>. Our results showed that more cigarettes may affect dental plaque deposition. (Table 3).

**Dental plaque distribution in oral cavity as per type of cigarettes smoked per day:** Our research showed that those Individuals who using without filter cigarettes have more plaque accumulation on the other hand those using filter has less deposition.

**Table No.1: Prevalence of sites of Dental Plaque Accumulation by Smoking Status**

Different Sites	Smokers (103)		Non-Smokers (285)	
	n	%	n	%
Lower Labial	3	2.9	5	1.8
Lower Buccal	10	9.7	12	4.2
Lower Lingual Anterior	16	15.5	6	2.1
Lower Lingual Posterior	9	8.7	5	1.8
Upper Labial	3	2.9	3	1.1
Upper Buccal	12	11.7	15	5.3
Upper Palatal Anterior	0	0	1	0.4
Upper Palatal Posterior	0	0	1	0.4
<b>Total sites</b>	<b>53</b>	<b>51.5</b>	<b>48</b>	<b>17.1</b>

**Table No.2: Prevalence of sites of Dental Plaque Accumulation in Smokers associated with duration of smoking in years**

Duration of Smoking	Plaque Sites		Non Plaque Sites	Total Sites
	n	%		
<5	4	3.5	107	112
5-9	4	3.5	106	112
10-14	10	3.6	271	280
>14	35	10.9	285	320
<b>Total</b>	<b>53</b>		<b>771</b>	<b>824</b>

( $\chi^2= 17.64$ ,  $df= 3$ ,  $p<0.001$ )

**Table No.3: Prevalence of sites of Dental Plaque Accumulation in Smokers associated with Number of Cigarettes per Day**

Number of Cigarettes	Plaque Sites		Non Plaque Sites	Total Sites
	n	%		
Mild Smokers (less than 10 Cigarettes)	21	3.4	603	624
Heavy Smokers (10 or more Cigarettes)	32	16	168	200
<b>Total</b>	<b>53</b>		<b>771</b>	<b>824</b>

( $\chi^2= 40.17$ ,  $df= 1$ ,  $p<0.001$ )

## DISCUSSION

According to our finding this is primary research examining relationship between smoking and dental plaque distribution in oral cavity in target residents. The result of this study confirms previous reports “suggesting the existence of a dose-response relationship between exposure to cigarette smoking and the occurrence of deposition of dental plaque in oral cavity both when exposure is measured in relevance to the frequency and duration of cigarette smoking<sup>4,5,9, 19</sup>. Our study mentioned that “the pattern of dental plaque differed between cigarette smokers and non cigarette smokers, with smokers presenting most regularly with dental plaque on the lower anterior lingual tooth surface, on the other hand, non cigarette smokers presented most frequently with dental plaque on the upper buccal tooth surface”. This results is in agreement with previous findings “reported for a Swedish population and US population but deviates from the results of other studies in which there was no association between smoking and distribution of dental plaque accumulation”.

Furthermore, a statistically significant association ( $p < 0.001$ ) was noted between cigarette smoking with period & number of oral cavity areas involved by plaque accumulation. “The highest number of plaque accumulation oral tooth surface was observed in subjects smoking for maximum like more than 14 years

(about 11%). On the other hand, the least number of accumulations of dental plaque tooth surfaces were noticed in individual cigarette smoking between 5 to 9 years and less than 5 years (3.5%)”. This emphasizes the fact that increases in the duration of cigarette smoking adversely affects the oral hygiene status of an individual<sup>5, 9, 25</sup>.

“Cigarettes with filter were introduced to reduce the adverse effects of conventional cigarette smoking. To the best of our knowledge none of the previous studies have investigated the association between type of cigarette (filtered / non-filtered) smoked and accumulation of plaque in oral cavity. Our study showed a statistically significant difference between the level of plaque accumulated by filtered and non-filtered cigarettes”.

Various factors have been suggested “to play a role in the increase in plaque accumulation in relevance to cigarette smoking. Although most of the studies emphasize that lower oxygen tension in the periodontal pocket of smokers favor the growth of anaerobic bacteria, thus, the quality of microbial flora<sup>10, 12</sup>. In addition to that, various studies have shown alteration of host immune response by cigarette smoking”<sup>19,23,27</sup>. Thus, the cumulative effect of these two factors may indirectly enhance plaque accumulated in cigarette smokers.

## CONCLUSION

Cigarette Smokers showed more regularly with accumulation of dental plaque than non cigarette smokers and the association mentioned it’s a dose-response effect. Dental plaque accumulation among cigarette smokers was most frequently found on the lower anterior lingual site on the other hand individuals who smoking cigarette without filtered and heavy smoker were more commonly affected.

### Author’s Contribution:

Concept & Design of Study: Irum Munir Raja  
 Drafting: Irum Munir Raja, Muhammad Nadeem  
 Data Analysis: Muhammad Nadeem, Uzma Zareef  
 Revisiting Critically: Irum Munir Raja, Muhammad Nadeem, Uzma Zareef  
 Final Approval of version: Irum Munir Raja

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

## REFERENCES

1. Koparal E, Tütüncü R. Investigation of plaque formation by scanning electron microscopy. Turkish J Med Sci 2000;30:119-24.

2. Furuichi Y, Lindhe J, Ramberg P, Volpe AR. Patterns of de novo plaque formation in the human dentition. *J Clin Periodontol* 1992;19:423-33.
3. Torrungruang K, Tamsailom S, Rojanasomsith K, Sutdhibhisal S, Nisapakultorn K, Vanichjakvong O, et al. Risk indicators of periodontal disease in older Thai adults. *J Periodontol* 2005;76:558-65.
4. Machuca G, Rosales I, Lacalle JR, Machuca C, Bullón P. Effect of cigarette smoking on periodontal status of healthy young adults. *J Periodontol* 2000;71:73-78.
5. Baljoon M, Natto S, Bergstrom J. The association of smoking with vertical periodontal bone loss. *J Periodontol* 2004;75:844-51.
6. González YM, De Nardin A, Grossi SG, Machtei EE, Genco RJ, De Nardin E. Serum Cotinine levels, smoking, and periodontal attachment loss. *J Dent Res* 1994;75:796-802.
7. Tomar SL, Asma S. Smoking-attributable periodontitis in the United States: Findings from NHANES III. *J Periodontol* 2000;71:743-51.
8. Winn DM. Tobacco use and oral diseases. *J Dent Educ* 2001;65:306-10.
9. Jacob V, Vellappally S, Smejkalová J. The Influence of cigarette smoking various aspects of periodontal health. *Acta Medica (Hradec Kralove)* 2007;50:3-5.
10. Haffajee AD, Soucransky SS. Relationship of cigarette smoking to the subgingival microbiota. *J Clin Periodontol* 2001;28:377-88.
11. Nwhator SO, Winfunke-Savage K, Ayanbadejo P, Jeboda SO. Smokers' melanosis in a Nigerian population: a preliminary study. *J Contemp Dent Prac* 2007;8:68-75.
12. Johnson GK, Slach NA. Impact of tobacco use on periodontal status. *J Dent Edu* 2001;65:313-21.
13. Darby IB, Hodge PJ, Riggio MP, Kinane DF. Clinical and microbiological effect of scaling and root planning in smoker and non smoker chronic aggressive periodontitis patients. *J Clin Periodontol* 2005;32:200-04.
14. Hedin CA, Axell T. Oral melanin pigmentation in 467 Thai and Malaysian people with special emphasis on smokers' melanosis. *J Oral Pathol Med* 1991; 20(1):8-12.
15. Araki S, Murata K, Ushio K, Sakai R. Dose-response relationship between tobacco consumption and melanin pigmentation in the attached gingiva. *Arch Environ Health* 1993; 38(6):375-8.
16. Hedin CA, Axell T. Oral melanin pigmentation in 467 Thai and Malaysian people with special emphasis on smokers' melanosis. *J Oral Pathol Med* 1991; 20(1):8-12.
17. Natali C, Curtis JL, Suarez L, Millman EJ. Oral mucosa pigment changes in heavy smokers and drinkers. *J Nat Med Assoc* 1991; 83(5): 434-38.
18. Chuong R, Golgberg MH. Case 47, part II: Oral hyperpigmentation associated with Addison's disease. *J Oral Maxillofac Surg* 1983;41(10): 680-82.
19. Grinspan D, Abulafia J, Diaz J, Berdichesky R. Melanoma of the oral mucosa. A case of infiltrating melanoma originating in Hutchinson's lentigo or precancerous melanosis of of Dubreuilh. *Oral Surg Oral Med Oral Pathol* 1969; 28(1):1-16.
20. Eisen D, Voorhees JJ. Oral melanoma and other pigmented lesions of the oral cavity. *J Am Acad Dermatol* 1991; 24:527-37.
21. Brocheriou C, Kuffer R, Verola O. Pigmented lesions of the oral cavity. *Ann Pathol* 1985;5(4-5): 221-29.
22. Cicek Y. The normal and pathologic pigmentation of oral mucuous membranes. A review. *J Contemp Dent Pract* 2003; 4(3):76-86.
23. Ramer M, Buracoff RP. Smoker's melanosis. Report of a case. *NY State Dent J* 1997; 63(8): 20-21.
24. Schwartz-Arad D, Samet N, Mamlider A. Smoking and complications of endosseous dental implants. *J Periodontol* 2002; 73(2): 153-57.
25. Nwhator SO. Periodontal disease in smokers: a study of factory workers in Lagos State. National Postgraduate Medical College Dissertation 2005.
26. Page LR, Corio RL, Crawford BE, Giansanti JS, Weathers DR. The oral melanotic macule. *Oral Surg Oral Med Oral Pathol* 1977; 44(2):219-26.
27. Laskaris G. Colour atlas of oral diseases. Thieme Med Pub 2nd Ed. Stuggart 1994;1-372.