

Difference in Plaque Removal from Buccal & Lingual Surfaces of Teeth by Manual Brushing

M. PERVAIZ IQBAL, M. ISMAIL SIDDIQUI, LUBNA KAUSAR, M. JAVED IQBAL

ABSTRACT

Aim: Present study was planned to evaluate the comparison between amounts of plaque on buccal and lingual surfaces of the teeth and the %age removal / reduction by brushing.

Methods: 50 healthy volunteers both male and female (20-23 years old) were inducted for this study. They were assessed for (24 hours old) plaque scores before the starts of experiment. They were then asked to brush their teeth with brushes of their own choice, for their own usual time & using their own style of brushing. Plaque scores were assessed using Gilmore-Glickman modification of Hein Plaque index. Only 31 participants completed three cycles of the experiment.

Results: Results show that more plaque accumulated on the buccal surfaces as compared to the lingual surfaces (53.21 & 51.22 respectively). The reduction in plaque after brushing was 65.11% on buccal surfaces while it was only 41.31% from the lingual surfaces. Lower lingual surfaces collected maximum plaque in this study.

Conclusion: There is a grave need to teach, the people, the correct method of brushing for complete removal of plaque and the maximum reduction of dental and periodontal diseases.

Keywords: Plaque removal, Buccal surface, Lingual surface, Manual brushing

INTRODUCTION

Oral cavity harbors about 300 different types of micro-organisms¹. Different organisms reside on different tissues of the oral cavity. These organisms get dislodged, always, from the surfaces as all the epithelia go on shedding. The only stable surface in the oral cavity is that made up by the crowns of the teeth. Micro-organism can stick to it and make permanent colonies. The organized colonization is called "dental plaque" which is defined as a "thin translucent, concentrated mass of microorganism, tenaciously adherent to the hard surface of teeth that extends to the margins of gingivae². Dental plaque is the cause of dental and periodontal diseases^{3,4,5}. Plaque starts forming when the microbes start accumulating in the depressions' of perikymata of teeth, near the gingival margins. These organisms multiply after about 8-12 hours and make a single cell thick layer on the available dental surfaces, (mostly cocci and rods make this initial plaque). Filamentous microbes are secondary invaders. The thickness of plaque increases by further multiplication of the microbes. After about 48 hours, the plaque becomes three cells thick. At this stage the deeper layers of the plaque become deficit in oxygen and thus encourage the growth of anaerobic and micro-aerobic, acid producing germs. This plaque is the cariogenic plaque⁶.

The plaque is to be removed effectively to prevent dental caries and periodontal problems. People use different methods to clear their teeth off this plaque. Brushing with commercially available tooth brushes is one of the most widely used methods by general population. Some other methods like powdered charcoal and wooden chewing sticks are still used by many for cleaning teeth. Many brands of tooth brushes are available in the market. People claim to use one or the other device to clean the teeth, but still almost every one is suffering from gingival problems⁷. It has been suggested that there is some deficiency in oral hygiene care by the people especially in certain specific areas of the teeth^{8,9}. Many studies show that there is not much significant difference among different types of brushes for plaque removing efficiency^{10,11,12}. Authors have observed during their clinical experiences that the people are more conscious about the outer surfaces of the teeth as compared to the lingual surfaces. Brushing is perhaps carried out more on the buccal surfaces as compared to lingual surfaces as the lingual surfaces are less clean as compared to the buccal surface. A study was thus designed to calculate the amount of plaque removed from the buccal & lingual surfaces of the teeth by manual brushes.

SUBJECTS AND METHODS

Fifty volunteers, all the dental faculty student of Nishtar Institute of Dentistry, Multan, fulfilling the criteria of inclusion, voluntarily willing, were included

Dept of Operative Dentistry, Nishtar Institute of Dentistry, Multan
Correspondence to Dr Muhammad Ismail Siddiqui,
e.mail:siddiquids@hotmail.com

in the study. 28 male and 22 female students participated in the study. Their ages ranged between 20-23 years.

RESULTS

Fifty volunteers participated in the study but only 31 participants completed all the three cycles. Results are compiled from the average of these 31 participants. The results have been summarized in table 1 to 3. The tables are very much self explanatory. The plaque of all 14 teeth in the jaw has been quoted. Third molar were excluded from the study.

Table 1: Pre and post brushing plaque on buccal surfaces

Surface examined	Pre-brushing plaque	Post-brushing plaque	Reduction	%
Upper buccal	27.70	9.51	18.19	65.7
Lower buccal	25.51	9.06	16.45	64.5
Total	53.21	18.56	34.65	65.11

Differences are significant $P < 0.05$

Table 2: Pre and post-brushing plaque on lingual surfaces

Surface Examined	Pre-brushing	Post-brushing	Reduction	%
Upper Lingual	22.22	14.03	8.19	36.85
Lower Lingual	29.00	16.03	12.93	44.58
Total	51.22	30.06	21.16	41.31

Differences are significant $P < 0.05$

Table 3: Comparison of plaque removal from buccal and lingual surfaces

Surface Examined	Pre-brushing	Post-brushing	Reduction	%
Buccal Surfaces	53.21	18.56	34.65	65.11
Lingual Surfaces	51.22	30.06	21.16	41.31

Differences are significant $P < 0.05$

Buccal surfaces of upper teeth collected a little bit more plaque (27.70) than the buccal surfaces of the lower teeth (25.51). The difference is not significant. Almost similar %age of reduction in plaque (65.7% in upper and 64.5% in lower) was observed after brushing. Plaque collected on the lingual surfaces of upper teeth (22.22%) is less as compared to that accumulated on the similar surface of lower teeth (29). The difference is statistically significant. The brushing removed more %age of plaque from lower teeth (44.72%) as compared to the

upper teeth (26.81%). Overall reduction in plaque after brushing from buccal surface is 65.11% while it is only 41.31% in lingual surface. These differences are statistically significant.

DISCUSSION

This study was conducted for evaluation of plaque accumulated on all the teeth. Removal of plaque by brushing was the other purpose. A comparison between the plaque before and after brushing from buccal and lingual surfaces was the major objective. In this study, efficacy of different brushes or the people was not assessed as it has already been assessed.^{13,14} The plaque accumulated on almost all teeth of both upper and lower jaws. The lingual surfaces of upper teeth collected less plaque. Lower lingual surfaces were the highest in plaque collection. (899) while the upper lingual surfaces collected least amount of plaque (663).

People are usually more conscious about the buccal surfaces and the anterior teeth specially. The results of the study confirm this fact. Although more plaque accumulated on buccal surfaces but the overall removal was also more (65.1%) as compared to the removal from the lingual surfaces (41.3%). Lower lingual surfaces collected more plaque as compared to upper lingual surfaces. It may be attributed to the fact that cleansing action of tongue is less on the lower lingual aspect and least on the lingual surfaces of posterior teeth. These surfaces are close to the attachment of the tongue to the floor of the oral cavity, so tongue movements are least in these areas. The removal of the plaque during brushing is also less from the lingual surfaces of the posterior teeth due to the same reasons. Present study shows that only 41.3% of the total plaque was removed from the lingual surfaces. Plaque removal was more from the lower lingual surfaces 44.7% as compared to the upper lingual surfaces 26.8%. Authors feel that the participants gave more time to the lingual surfaces of lower teeth reason being unknown. Results of present study are different from another study¹³ in which authors observed that there was almost equal removal of plaque from all surfaces of teeth.

Another study however shows that there was a significant difference between the plaque removal from buccal surfaces and the lingual surfaces (69% viz 21%)¹⁵. Results of present of study are in accordance with this earlier study. In some studies, it was observed that the average time taken for brushing was about 50 seconds while only 10% of the total time was used for cleaning of the lingual sides of teeth^{8,9,16}. It was also observed in present study. Less time was used for lingual surfaces and so

is the plaque removal. About 1/3 less amount of plaque was removed on the lingual surfaces of the teeth. The time consumed for brushing in the present study is 1-1.5 minutes while it was only 50 seconds in the about mentioned studies. These previous studies^{7,8} also show that about 60% of plaque is removed in that time. This finding is confirmed in the present study only for buccal surfaces. Much less plaque was removed from the lingual surfaces. In a review article, it has been observed that the lingual plaque is formed more rapidly and is more adherent.¹⁷ In addition the lingual inclination of posterior teeth and the lesser movement of tongue make the plaque formation easier and its removal difficult. It is confirmed in the present study that more plaque was accumulated on lingual surfaces of lower teeth and less (%age) amount of plaque was removed from the lingual surfaces of all teeth.

The supra gingival plaque if not removed from the teeth for four days shall lead to subclinical gingival inflammation^{17,18}. If this situation persists, there may be a shift of sub-gingival microbes from gram +ve to gram -ve anaerobic microbiota¹⁹. These observations necessitate a thorough removal of the plaque frequently. At least once brushing within 48 hours is the minimum requirement for prevention of gingivitis and caries^{6,20,21}. From the discussion it is evident that gingival and dental diseases (gingivitis and the caries) cannot be prevented by the routine brushing carried out by the general population as only about 60% of the plaque is removed from the teeth. Left over plaque, mostly on the cervical areas of teeth, as observed in the present study, shall causes initiation of the dental and periodontal problems.

CONCLUSION

From the results of the study, it may be concluded that the %age plaque removal is less from the lingual surfaces of the teeth while maximum plaque accumulates on the lingual aspects of lower teeth, although the total amount of lingual plaque is less as compared to the buccal plaque. Brushing technique has to be taught in a better way to the general population for reduction of dental and periodontal problems.

REFERENCES

1. Socransky SS. The compendium of continuing education in dentistry, supplement No. 5: 53-65, 1984
2. Iqbal MP. Operative Dentistry, brief concepts, new Ideas. Nuoray publications, Multan Pakistan. 1996.
3. Lolarto DC. Influence of a composite resin restoration on the gingiva. *J Prosthetic Dent* 1992; 28(4): 402-4.
4. Fehr, Von der, FR, Loe H, Theilade E. Experimental caries in man. *Caries Res* 1970; 4: 131-48.
5. Loe H, Theilade E, Jensen SB. Experimental gingivitis in man. *J Periodontol* 1965; 36: 177-87.
6. Nyved, B, Fejerskovr D. Formation composition and ultra structure of microbial deposits on the tooth surfaces: from Thylstrup A, Fejerskor O, Text book of cariology. Munksguard, Copenhagen 1986 PP: 56-73.
7. Iqbal M, Hamid MW; Oral health survey of 5 religious schools in Multan. *Pak Oral Dent J* 1978; 12(2) 38-48.
8. Rugg Gunn AJ, Macgregor IDM. A survey of tooth brushing behavior in children and young adults. *J. Periodontal Res* 13: 382-388, 1978.
9. Macgregor IDM, RuggGunn AT: A survey of tooth brushing sequence in children and young adults. *J. Periodontal Res*: 14: 225-230, 1978.
10. Hancock E. Prevention world workshop in periodontics. *Ann Periodontol* 1996; 1: 223-49.
11. Claydos N, Addy M. The use of planimetry to record and score the modified navy index and other bases indices. *J Clinical Periodontal* 1995; 22: 670-3.
12. Ashri N, Al-Khattam R, Waiffa SH. The effect of tooth brush design and brushing proficiency on plaque removal. *J Pak Dent Assoc* 2003;12:83-9.
13. Sripriya N, Shaik Hyder Ali KH. A comparative study of the efficacy of four different bristle design of tooth brushes in plaque removal. *J Indian Soc Pedod Prev Dent*: 2007; 76-81.
14. Ashri NY. Clinical study on the plaque removing ability of three new tooth brushes. *Pak Oral Dent J* 2007; 27(2): 223-8.
15. Vander Weijder GA, Timmerman MM, Vander Valden U. Relationship between the plaque removal efficacy of a manual tooth brush and brushing force. *J Clin Periodontol* 2006;25:413-6.
16. De La Rosa MP, Guerra IZ, Johniton DA, Radiks AW. Plaque growth and removal with daily tooth brushing. *J Periodontal* 1979; 50: 660-5.
17. Addy M, Slayne MA, Wade WG. The formation and control of dental plaque-an overview. *J Applied Bacteriol* 1992; 73: 269-78.
18. Lang NP, Cumming BR, Loe H. Tooth brushing frequency as it relates to plaque development and gingival health. *J Periodontal* 1973;44:396-9.
19. Axelsson P. Mechanical plaque control from Lang NP, Karing T (editors), proceeding of the 1st European workshop on periodontology London. Quintessence publishing Co. Ltd: 219-243, 1978.
20. Loe H. How frequently must patients carry out Oral Hygiene procedure in order to maintain gingival health. *J Periodontal* 1971; 42: 312-3.
21. Loe H. Oral Hygiene in prevention of caries and periodontal diseases. *Int. Dent J* 2000;50:128-39.