

Role of manual and powered tooth brushes in plaque removal and oral health status.

(A comparative study)

دور التنظيف اليدوي بالفرشاه والتنظيف الكهربائي بالفرشاه في ازاله البكتريا والحفاظ على صحة الفم (دراسه مقارنه)

Salah Mahdi ibrahim

kufa university – college of dentistry

Abstract

Aim of the study: evaluate the plaque and calculus removal during the manual and powered brushing of teeth and To compare manual and powered toothbrushes in everyday use, principally in relation to plaque removal .

Materials and Methods: A randomized blinded controlled trial with 50 healthy human volunteers of age group 18-25 years was carried out. The subjects were randomly assigned to 2 groups i.e., groupA - manual brushing with and without dentifrice, Group B - powered brushing with and without dentifrice. Plaque accumulation and gingival condition were recorded using plaque index .The test treatments were brushing with 2 oscillating rotating electric toothbrushes, a manual toothbrush and a rinse with a toothpaste slurry (3 g/10 ml water)

Results: Mean plaque and gingival scores was reduced over the 3 week trial period for all groups manual Brushing with or without a dentifrice resulted in a mean plaque reduction of 49% and powered brushing with or without a dentifrice resulted in a mean plaque reduction of 60% .

Discussion: the efficacy of plaque removal has been emphasized more with powered tooth brush rather than manual tooth brush, and as brushes with hard bristles may precipitate adverse changes associated with brushing, like, abrasion of tooth surface as well as traumatizing the gingival margin, the need of hard bristled toothbrushes in the market is questionable

Conclusion: the plaque and calculus has removed during the manual and powered brushing of teeth. powered tooth brush has more effect than manual tooth brush in removing plaque and calculus.

Keywords: manual , powered tooth brushes, gingivitis , oral hygiene, plaque index.

الملخص

هدف الدراسة: تقييم إزالة البكتريا والتكلسات الفموية أثناء التنظيف اليدوي والمشغل للأسنان ولمقارنة التنظيف اليدوي للفرش والكهربائي في الإستعمال اليومي، أساسا فيما يتعلق بإزالة اللوحة والصحة اللثية. اللطخة والصبغات **المواد والطرق:** مجموعة عشوائية من الطلاب بحدود 50 بحاله صحيه جيده مجموعة العمرية 20-23 سنوات نفذت. المواضيع خصصت بشكل عشوائي إلى مجموعتين وبمعنى آخر: .،مجموعه 1 - تنظيف يدوي مع وبدون معجون أسنان، مجموعة 2 - شغل التنظيف مع وبدون معجون أسنان. تسجيل الحاله الصحيه للفم بواسطه لوحه البكتريا ولوحه الحاله الصحيه للفم كانت تنظف بتذبذب تدوران فرش أسنان كهربائية ، a فرشاة أسنان يدوية و a تنظيف مع a معجون أسنان 3 g slurry /10 ماء مليلتر)

النتائج: اللوحة المتوسطة والأعداد كبيرة اللثية خفضا على الـ 3 خلائل فتره الإِسبوع لكل تنظيف المجموعات اليدوي مع أو بدون a أديا معجون أسنان إلى a تخفيض لوحة متوسط 49 % وشغلا التنظيف مع أو بدون a أديا معجون أسنان إلى a تخفيض لوحة متوسط 60 %.

المناقشة: هذا تخفيض اللوحة لدرجة كبيرة إلى تقريبا 49 % للتنظيف بفرشاة الأسنان اليدوية {بي قيمة < 0.05} و 60 % بفرشاة الأسنان المشغلة {بي قيمة < 0.05}. إختلافات هامة جدا لوحظت بين جدول 1 و جدول 2. منذ كفاءة إزالة اللوحة أكدت أكثر بفرشاة الأسنان المشغلة بدلا من فرشاة أسنان يدوية، وكفرش بالشعر الخشن الصعب قد يعجل تغييرات مضادة إرتبطت بتنظيف، مثل، حك سطح السن بالإضافة إلى صدم الهامش اللثني، حاجة فرش الأسنان المنتصبة الصعبة في السوق مشكوك فيها.

الخاتمة: اللوحة وحساب التفاضل والتكامل أزالا أثناء التنظيف اليدوي والمشغل للأسنان.

فرشاة الأسنان المشغلة لها تأثير أكثر من فرشاة الأسنان اليدوية في إزالة اللوحة وحساب التفاضل والتكامل.

الكلمات الدلالية: الدليل، شغل فرش الأسنان، التهاب لثة، نظافة شفهية، لوحة، دليل.

Introduction

It is widely agreed in dentistry that plaque consist of a combination of pathogenic microorganisms and host cells. Which consider is the principal etiological factor associated with periodontal disease. Since Loe's experimental gingivitis, [1] thorough plaque control has been essential to control and prevent gingival and periodontal disease. Supra gingival plaque control is dangerous in preventing both initial gingivitis and periodontal disease in all stages. [2] Mechanical tooth cleaning by means of a toothbrush and a dentifrice remains the most effective and common method for controlling supra gingival plaque. [3],[4]

Dentifrices are supposed to prevent plaque buildup, strengthening teeth against caries, elementing stains, removing food debris, and control the oral mouth. [5],[6] Dentifrices containing anti-plaque and anti-inflammatory agents would also elemental plaque and help in overcoming the manual or mechanical shortcomings of brushing. [7]

Most of the studies that evaluate the role of a dentifrice in plaque removal and those that assess different toothbrush designs, were done by making comparison of the result product with the control. In such studies, the obtained plaque removal score could be due to the use of toothbrush and dentifrice, it was difficult to distinguish the contribution of either toothbrush or dentifrice.

there are several studies that attempted to define the role of dentifrices in plaque removal during mechanical tooth brushing. One study [8] stated that brushing with a dentifrice removed more plaque than brushing alone. Another study [9] found no difference between brushing with or without a dentifrice; in another studies done by Binny *et al.*, [10] and Paraskevas *et al.*, [11] brushing without a dentifrice found more plaque reduction when brushing without dentifrice than brushing with a dentifrice. A recent study [12] showed that the use of a dentifrice is not cause additional plaque removal during manual tooth brushing and concluded that the mechanical action provided by the toothbrush is crucial in plaque control. Although each study differs in factors related to the study methodology, the overall result is important.

The present study was undertaken in order to view the conflicting role of dentifrices and the effect of its role when used in associated with tooth brushing. The aim of the present study is to detect the actual role of the dentifrice and demystify its effect when associated with use of tooth brush.

Efficacy of tooth brushing

De la Rosa and coworkers (1979) studied the appearance of plaque accumulation and removal with daily tooth brushing during a 28-day period following a dental prophylaxis. On average about 60% of the plaque was left after the self-performed brushing. Morris *et al.* (2001) reported on the 1998 UK Adult Dental Health survey and observed that the mean proportion of teeth with plaque deposits was 30% in the 25–34-year age group and 44% in those aged 65 years and above. At the Academic Centre for Dentistry Amsterdam (ACTA) a study was conducted which assessed the efficacy of a single 1-minute brushing exercise in subjects adhering to their customary brushing method (Van der Weijden *et al.* 1998a). It was observed that after 1 minute of brushing, approximately 39% of the plaque had been removed. The results of the studies described above indicate that most subjects are not effective brushers and that they probably live with large amounts of plaque on their teeth, even though they brush once every day

Electric toothbrushes

To invest the necessary time and effort to well instructed and motivated and properly instructed individuals who are doing, international toothbrushes and adjunctive manual (interdental) devices, mechanical measures, are effective in removing plaque. Maintaining a dentition close to plaque-free is, however, not easy. Plaque removal and patient motivation were done by the electric toothbrush. Electric toothbrushes were made to the market more than 50 years ago. Bemann & Woog in Switzerland, the first toothbrush powered by electricity was developed by them and was introduced in the United States in 1960 as the Broxodont. General Electric (Darby & Walsh 2003). In 1961 a cordless rechargeable model was introduced by Studies of the use of these early electric toothbrushes showed that there was no difference in plaque removal when compared with a manual toothbrush and they had mixed effects on gingivitis.

Aims of the study:

This study has used to

1. detect the effect of plaque and calculus removing during the use of manual and powered brushing of teeth.
2. we make comparison by manual and powered toothbrushes in everyday use, principally in relation to plaque removal and gingival health. Stain, calculus removal.
3. compare the role of using the manual and powered brushing of teeth in the reduction of gingivitis and plaque.

Materials and Methods

Study design

The group study consisted of 50 students of College of Dentistry, Kufa, Iraq. Male and female in age range (20-23) years. The volunteers were examined in perfect study with suitable time to indicated severe cases in relation to periodontal disease and restorative-related problems. Data collected by the use of dental mirror, probe and The study period lasted for 10-week.

Single-examiner blind were used for examination. A group of 25 subjects participated in this, randomised, crossover design. Subjects had fair oral hygiene and the electrical toothbrush never used previously. Subjects were plaque free in 7 days by the use of rotating electric toothbrushes, a manual toothbrush and a rinse with a toothpaste slurry (3 g/10 ml water)..

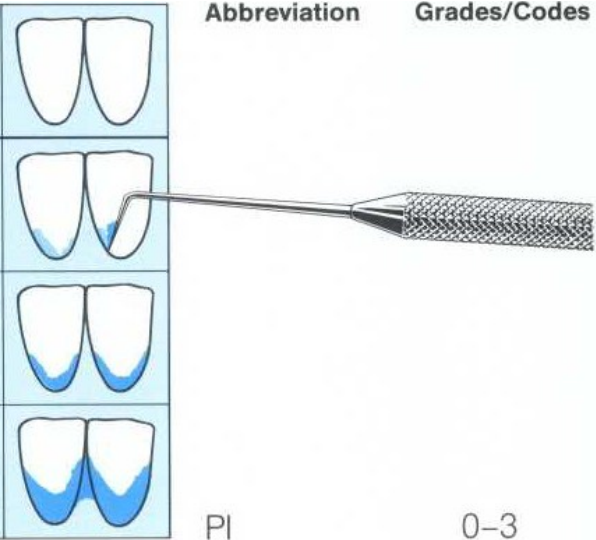
Brushing exercise

Before starting, the patient were asked to wet the brush head with tap water and the brushing time was two minutes for the whole mouth, [16],[17] 30 seconds per quadrant ,15 seconds for the buccal side, and 15 seconds for the lingual side. When dentifrice was used for brushing, 2 ml of dentifrice was add onto the toothbrush using a syringe with dentifrice (sensodyne). The supervision of the brushing procedure was done by a different examiner . A stop veiwing was used and a signal was given to the subject to change the brushing surface.

The clinical parameter

Plaque index (Silness and Loe 1964)

Grade		Abbreviation	Grades/Codes
0	No plaque		
1	Thin film of plaque at the gingival margin, visible only when scraped with an explorer		
2	Moderate amount of plaque along the gingival margin; interdental space free of plaque; plaque visible with the naked eye		
3	Heavy plaque accumulation at the gingival margin; interdental space filled with plaque	PI	0-3



The diagram illustrates the four grades of plaque index. Grade 0 shows clean teeth. Grade 1 shows a thin blue film of plaque at the gingival margin, which is only visible when scraped with an explorer. Grade 2 shows a moderate amount of blue plaque along the gingival margin, visible to the naked eye. Grade 3 shows heavy blue plaque accumulation at the gingival margin, filling the interdental space. An explorer tool is shown pointing to the plaque in the Grade 1 diagram.

Results

Fifty two students {volunteers}, 10 students didn't participate after the first phase, either due to their college examination ^[4] or because of their sickness. ^[2] The remaining 42 students were divided into two groups (1 and 2) of 21 each and they use tooth paste randomly. The mean of the total plaque indices by manual brushing with and without dentifrice are tabulated in [Table 1]. the mean of the plaque indices by powered brushing with and without tooth paste are tabulated in [Table 2]. Manual Brushing with or without a dentifrice resulted in a mean plaque reduction of 49% and powered brushing with or without a dentifrice resulted in a mean plaque reduction of 60% . This 11% difference is highly significant ($P \leq 0.0001$).

Table 1: mean plaque index of manual tooth brush

time	Mean plaque	p
1 week	1.7	0.475
2 weeks	1.4	
3 Weeks	1.3	
4 Weeks	1.3	
5 Weeks	1.2	
6 weeks	1.2	
7 Weeks	1.2	
8 weeks	1.1	
9 Weeks	1	
10Weeks	0.9	

P-value>0.05

Table 2: mean plaque index of powered tooth brush

time	Mean plaque	p
1 week	1.9	0.571
2 weeks	1.5	
3 Weeks	1.4	
4 Weeks	1.4	
5 Weeks	1.4	
6 weeks	1.3	
7 Weeks	1.1	
8 weeks	1.0	
9 Weeks	0.9	
10Weeks	0.8	

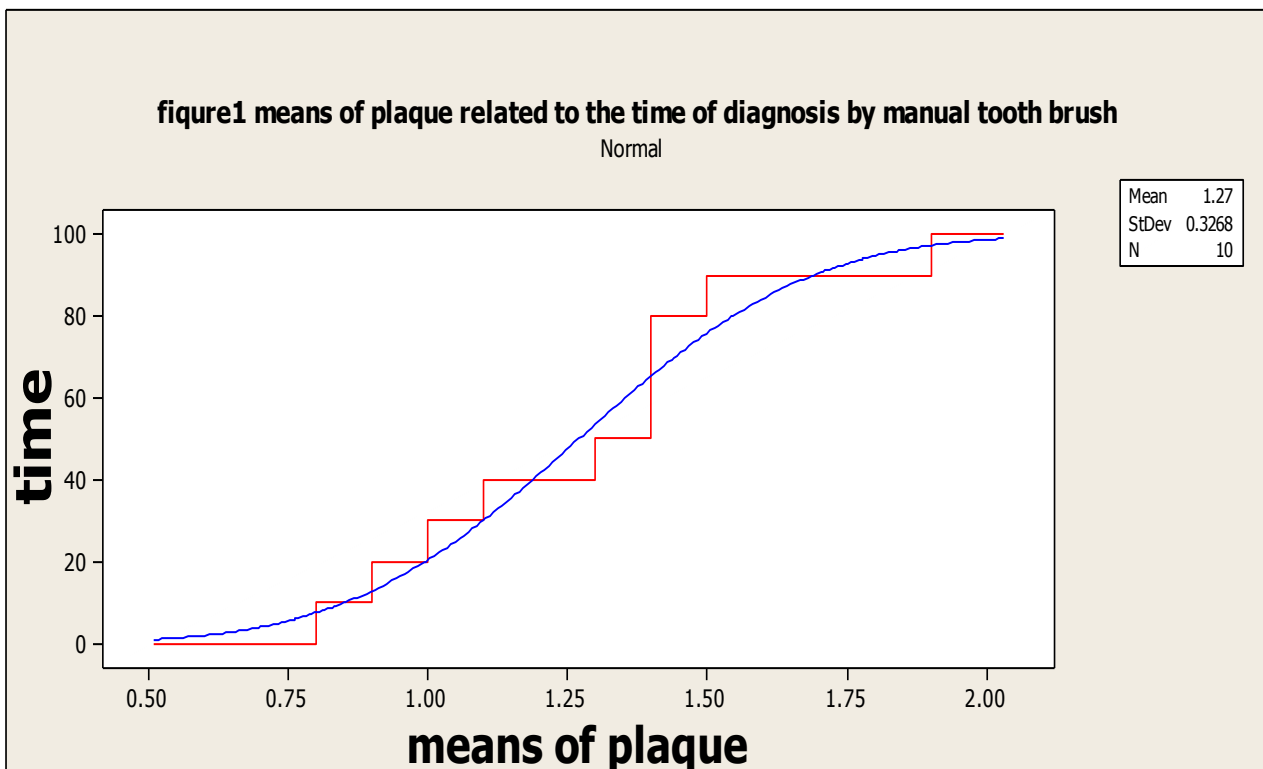
P-value >0.05

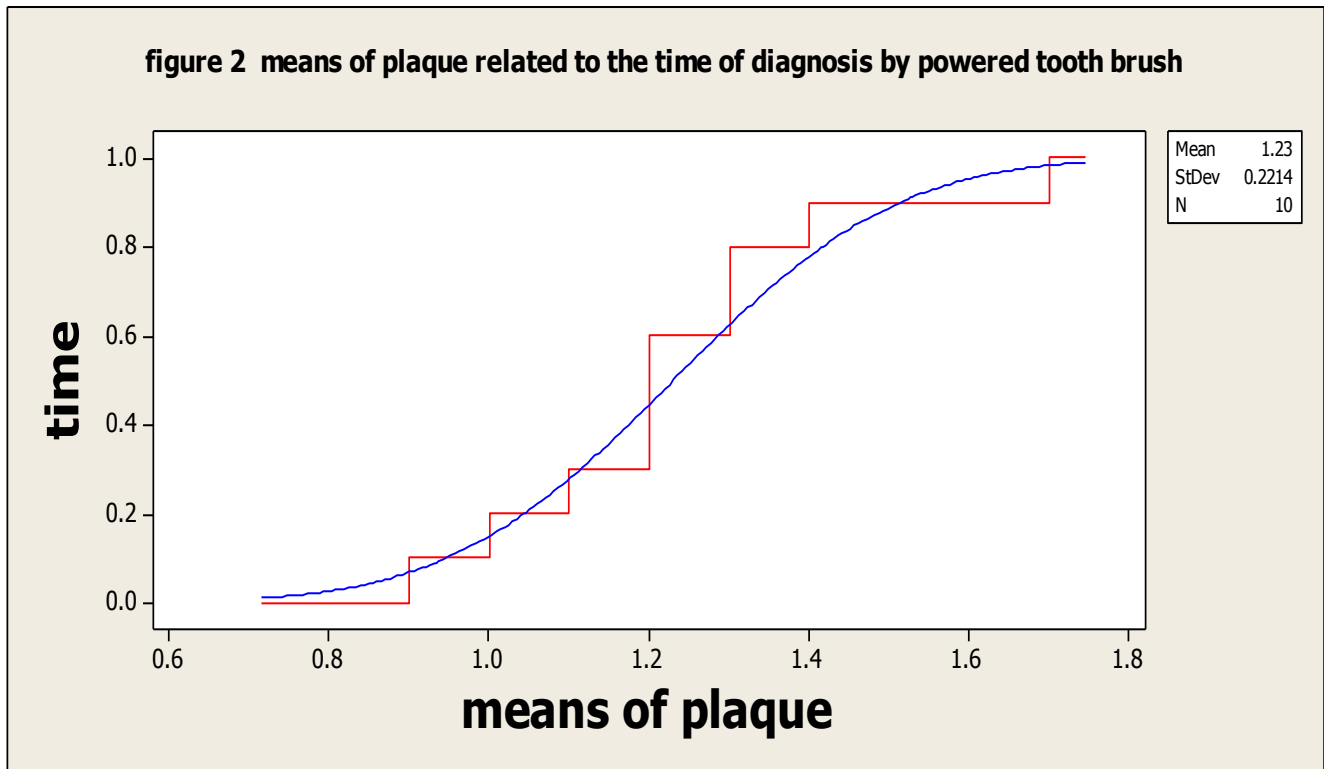
Inter group comparison between manual tooth brush and powered tooth brush by one way annova was highly significant ($P \leq 0.0001$).

	F-test	p-value	Sig
TABLE 1 AND TABLE 2	9.8	0.000	HS

Pearson correlation of manual tooth brush and powered tooth brush was highly significant ($P \leq 0.0001$)

	p-value	Pearson(r)
manual tooth brush and powered tooth brush	0.000	0.966





Discussion

the primary tool in overall plaque control inThe toothbrush alone has long been considered. [28] Adelivery vehicle such as fluoride, tartar, consider as breath control components of The dentifrice. [29) the bacterial paque consider as amain etiologial factor of periodontal disease . The studies of Loe and his associates (1965) have clearly demonstrated that bacterial plaque is a major etiologic factor in inflammatory periodontal disease.

The use of the toothbrush is not effective with a high standard of oral hygiene. Adults,with suitable method, appear not to be as effective in their plaque removal as might be expected. Most individuals only elemenating about 50% of plaque by tooth brushing (Jepsen 1998) the plaque has been reducated to almost 49 % for brushing by manual tooth brush { P-value >0.05} and 60% by powered tooth brush {P-value >0.05} . [6] highly significant differences were noted between these groups. the efficacy of plaque removal has been approved more with powered tooth brush rather than manual tooth brush.

I could agree with Dr. Perry. but I would appreciate comments from anyone on the panel. the way that we have analyzed the literature in the field I have some concerns. The results of some 60 studies favored the powered brush, and there was no difference in another 40 studies. In this particular field. We all know how much more difficult it is to publish studies which show no differences between the test groups.

Dr. Heasman. I could not agree more. In the Rotadent® study, the way that we have analyzed the literature in the field there were no surrogate markers, only tooth loss at the end of the 10-year period. More studies are how effective these brushes are in maintaining dentitions intact and keeping dentitions functional and aesthetic needed over a longer period to provide a clearer view.

Conclusion

This study showed that This program conducted 10 weeks s were more effective than those .conducted at six-week intervals in improving oral health knowledge,regarding plaque index. powered tooth brush has more effect than manual tooth brush in removing plaque and calculus . People buy tooth brush with or without dentifrice not only to clean the teeth, but also for its content of an anti-caries action, desensitizing effects, for the feeling of freshness and to reduce malodor.

References

1. Loe H, Theilade E, Jensen SB. Experimental gingivitis in man. J Periodontol 1965;36:177-87.
2. Killooy WJ, Love JW, Love J, Fedi PF Jr, Tira DE. The effectiveness of a counter-rotary action powered toothbrush and conventional toothbrush on plaque removal and gingival bleeding: A short term study. J Periodontol 1989;60:473-7.
3. Johnson BD, McInnes C. Clinical evaluation of the efficacy and safety of a new sonic toothbrush. J Periodontol 1994;65:692-7.
4. Wade WG, Addy M. Antibacterial activity of some triclosan-containing toothpastes and their ingredients. J Periodontol 1992;63:280-2.
5. Forward GC, James AH, Barnett P, Jackson RJ. Gum health product formulations: What is in them and why? Periodontol 2000;1997:15: 32-9.
6. Forward GC. Role of toothpastes in the cleaning of teeth. Int Dent J 1991;41:164-70.
7. Mandel ID. Chemotherapeutic agents for controlling plaque and gingivitis. J ClinPeriodontol 1988;15:488-98.
8. Eid MA, Talic YF. A clinical trial on the effectiveness of professional tooth brushing using dentifrice and water. Odontostomatol Trop 1991;14:9-12
9. Parizotto SP, Rodrigues CR, Singer Jda M, Sef HC. Effectiveness of low cost toothbrushes, with or without dentifrice, in the removal of bacterial plaque in deciduous teeth. PesquiOdontol Bras 2003;17:17-23.
10. Binney A, Addy M, Newcombe RG. The plaque removal effects of single rinsing and brushings. J Periodontol 1993;64:181-5.
11. Paraskevas S, Timmerman MF, van der Velden U, van der Weijden GA. Additional effect of dentifrices on the instant efficacy of tooth brushing. J Periodontol 2006;77:1522-7.

12. Paraskevas S, Rosema NA, Versteeg P, Timmerman MF, van der Velden U, van der Weijden GA. The additional effect of a dentifrice on the instant efficacy of tooth brushing: A crossover study. *J Periodontol* 2007;78:1011-6.
13. Quigley G, Hein J. Comparative cleansing efficacy of manual and power brushing. *J Am Dent Assoc* 1962;65:26-9.
14. Turesky S, Gilmore ND, Glickman I. Reduced plaque formation by the chloromethyl analogue of vitamin C. *J Periodontol* 1970;4:41-3.
15. Lobene RR, Soparkar PM, Newman MB. Use of dental floss: Effect on plaque and gingivitis. *ClinPrev Dent* 1982;4:5-8.
16. McCracken GI, Janssen J, Swan M, Steen N, de Jager M, Heasman PA. Effect of brushing force and time on plaque removal using a powered toothbrush. *J ClinPeriodontol* 2003;30:409-13.
17. Van der Weijden GA, Timmerman MF, Nijboer A, Lie MA, Van der Velden U. A comparative study of electric toothbrushes for the effectiveness of plaque removal in relation to tooth brushing duration. Timer study. *J ClinPeriodontol* 1993;20:476-81.
18. Claydon NC. Current concepts in tooth brushing and interdental cleaning. *Periodontol* 8;48:10-22.
19. Addy M, Moran JM. Evaluation of oral hygiene products: Science is true; Don't be misled by the facts. *Periodontol* 2000 1997;15:40-51.
20. Davies RM. Toothpaste in the control of plaque/gingivitis and periodontitis. *Periodontol* 2008;48:23-30.
21. Volpenhein DW, Sagel PA, White PJ. Dentifrice enhancement of plaque removal by manual brushing. Research paper presented at the 75th General Session of the IADR, Orlando: Florida; 1997. p. 19-23.
22. Harrap GJ. Assessment of the effect of dentifrices on the growth of dental plaque. *J ClinPeriodontol* 1974;1:166-74.
23. Arweiler NB, Auschill TM, Reich E, Netuschil L. Substantivity of toothpaste slurries and their effect on reestablishment of the dental biofilm. *J ClinPeriodontol* 2002;29:615-21.
24. Renton-Harper P, Addy M, Newcombe RG. Plaque removal with the uninstructed use of electric toothbrushes: Comparison with a manual brush and toothpaste slurry. *J ClinPeriodontol* 2001;28:325-30.

[25](#). Koch G, Paquette D. Study designs and statistical considerations. Ann Periodontol 1997;2:42-63.

[26](#). Niemi ML, Sandholm L, Ainamo J. Frequency of gingival lesions after standardized brushing as related to

[27](#) stiffness of toothbrush and abrasiveness of dentifrice. J ClinPeriodontol 1984;1:254-

61.

[28](#) West NX, Moran JM. Home-use preventive and therapeutic oral products. Periodontol

2008;48:7-

[29](#) Claydon NC. Current concepts in tooth brushing and interdental cleaning. Periodontol . 2008;48:10-22. Back to cited text no. 18