

Efficacy of power versus manual toothbrushing for compromised patients in reducing plaque index and gingival index

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Abstract

Background: Efficacy of power over manual tooth brushes is the topic of debate since the advent of powered tooth brushes, although no significant difference in the plaque removal of both the brushes is observed in many studies, but the Cochrane review suggests a modest reduction of plaque and gingivitis with the powered tooth brushes as compared to the manual. **Objective:** The Aim of our study is to compare the efficacy of power vs manual toothbrush, so as the use of power tooth brush can be promoted in the compromised groups of patient such as geriatric population and children. **Material and methods:** study subjects were divided in to two groups. One was given a manual tooth brush and the other was given a powered tooth brush. Base line values of PI and GI was recorded, then the values of PI and GI were recorded after 2 weeks and 4 weeks. The results were then compared statistically. Results: No significant difference was observed in both the groups in terms of PI and GI after 2 and 4 weeks. **Conclusion:** Both manual and powered tooth brushes have comparable efficacy in terms of gingival health and plaque removal.

Keywords: Electric Tooth Brush, Gingival Index [GI], Manual Tooth Brushes, Plaque Index [PI], Power Tooth Brush.

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Introduction

Dental plaque can be defined as the community of microorganisms found on a tooth surface in a biofilm, embedded in a matrix of polymers of host and bacterial origin[1,2].The importance of tooth brushing in daily dental regime cannot be ignored. Tooth brushing ensures plaque removal and hence prevents tooth decay and gum disease. It also prevents the build-up of plaque. It is a well-known fact that plaque formation and maturation are responsible for the development of gingivitis[3].Since the development of first toothbrushes made up of ivory brush handles with the bristles, the toothbrushes have come a long way. Till date mechanical plaque removal with manual toothbrush is the primary method of maintaining oral hygiene for most of the population. Since the development of the first electric toothbrush in 1961, the debate continuous about its efficacy as compared to the manual ones. Many studies conducted in the past power toothbrushes never found to be superior over the manual ones[4,5].Still power toothbrushes are of great help for the persons with reduced manual dexterity and handicaps. It is also observed that to master the right technique of manual tooth brushing is not that easy for everyone in these scenarios the use of electric toothbrush may result in better cleaning of teeth. Since the development of electric toothbrushes there has been much advancement in the technology for example the development of oscillating rotating brushes which moves back and forth and does not

rotate in full circles[6].With the development of Sonicare electric tooth brushes in 1993 the powered tooth brushes have reached to new Heights.In these type tooth brushes the vibrations result in Cavitation and acoustic streaming generating fluid movement and hence the cleaning is slightly away from the tip. While comparing manual toothbrushes with powered ones, it was observed that the time spent in manual brushing is usually less than 2 min where as in most of the powered tooth brushes there is a timer of 2 min and hence people using powered brushes do essentially brush for full 2 mins. It is also observed that the brushing forces are significantly higher in Manual brushing hence may lead to enamel abrasion[7]. Where as in powered brushes it is controlled and there are few who come with sensors and do indicate if more pressure is applied.As per the available literature no difference was found when the efficacy of manual tooth brushes, was compared to that of powered ones, but with the advent of newer technologies this debate has again resurfaced, so we under took the current study to compare the efficacy and safety of a new power toothbrush in comparison with a standard flat trim ADA approved manual brush.

Material and methods

This randomised control trial was conducted on total 38 subjects with age 18 and above were included in the study.

Inclusion criteria

- Subjects 18 years and above for included in the study
- Subjects who have not undergone any periodontal or surgical procedure in last two years
- Subjects who have not undergone scaling and root planing in last 6 months were included.

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Exclusion criteria

- Patients those who are physically and mentally challenged were excluded from the study.
- Patients less than 18 years of age
- Patients who have undergone any periodontal oral surgical procedure in last 2 years
- Patients who have undergone professional scaling and root planing in last 6 months were also excluded from the study.

Subjects were randomly assigned into two groups.

Group 1-manual toothbrush (n=20) and Group 2- power toothbrush (n=18).Both the groups were asked to refrain from regular use of mouthwash or any other entered into aid till the time of study. A professional brushing demonstration and training was given to all of them. The plaque index was taken at the time of enrolment after 2 weeks of enrolment and after 4 weeks of enrolment of the subjects. The amount of dental plaque and gingival condition were assessed by silness and Loe[8] and Loe and silness[9] respectively. All the examinations were performed by dental surgeon who have passed and intra and inter examiner calibration before the beginning of study.Indices were recorded with the help of WHO probe. Before every visit the subjects were asked not to brush their teeth for at least 7 hours before their scheduled visit. The subjects of group 1 were

provided with ADA approved manual toothbrush and the subjects of group 2 were provided with powered toothbrush.

Results

Total 38 subjects were enrolled in the study, out of them 20 were in Group 1 (Manual toothbrush) and 18 in Group 2 (Power toothbrush). There were total 25 males and 13 females in this study, out of those 12 males were in Group 1 and 13 were in Group 2. 8 females were in Group 1 and 6 in Group 2. (Table1)At the time of initiation of the study the PI and GI scores of each participant was calculated.The mean Initial PI for Group 1 was 2.06 ± 0.75 and that of Group 2 was 2.17 ± 0.18 and the mean GI for Group 1 was 1.98 ± 0.28 and Group 2 was 1.87 ± 0.36 . When both the groups were compared statistically no significant difference was found in them, suggesting that both the groups were comparable at the beginning of the study.(Table 2)PI and GI for both the groups were then compared after 2 weeks. No significant difference was observed in both PI and GI in both the groups after 2 weeks. The P value for PI was 0.4861 and that of GI was 0.5754. (Table 3)PI and GI values for both the groups were then compared after 4 weeks of initiation of the study. Still no significant difference was observed in both the groups. The P value for the comparison of PI was 0.7093 and that of GI was 0.1489. (Table 4)

Table 1: Demographic data

	Male	Female	Total
Group 1	12	8	20
Group 2	13	6	18
Total	25	13	38

Table 2: Showing the PI and GI at the time of initiation of study

	Mean PI	Mean GI
Group 1(n=20)	2.06 ± 0.75	1.98 ± 0.28
Group 2(n=18)	2.17 ± 0.18	1.87 ± 0.36
P-value	0.5483	0.2975

Table 3: Showing the PI and GI after 2 weeks

	Mean PI	Mean GI
Group 1	1.85 ± 1.2	1.54 ± 0.42
Group 2	1.60 ± 0.96	1.48 ± 0.17
p-value	0.4861	0.5754

Table 4: Showing the PI and GI after 4weeks

	Mean PI	Mean GI
Group 1	1.40 ± 0.66	1.37 ± 0.31
Group 2	1.32 ± 0.65	1.24 ± 0.22
p-value	0.7093	0.1489

Discussion

Tooth brushing is the most common mode of oral hygiene method used in daily routine. Various types of tooth brushes with different designs and shapes are available which raises concern among the general public about choosing the best. In this race there are powered tooth brushes too, hence the most common question asked by patients is which tooth brush is best powered or manual? Since the advent of powered tooth brushes and till date this debate about the efficacy of Powered vs manual tooth brush is continued. Most of the earlier studies reveal that there is no difference in manual and powered tooth brushes in terms of plaque removal. The aim of our study was to compare the efficacy of power tooth brush with the manual ones. This comparison is also important from the point of view of the patient those who have some debilitation and can't use manual tooth brush effectively, like special children, children with mental and physical disability, geriatric population and children who are quite reluctant for the toothbrushing etc. We divided the study subjects in two groups one was given manual tooth brush of same company and make and the other was given powered tooth brush, all the tooth brushes in this group was also from one company and were of same make.The PI and GI for both the groups was recorded at the initiation of the study, this was considered as the base line value and all other readings were compared from this value.It was found that

both the groups were comparable at the time of study with no significant difference in both PI and GI values of both the groups.The readings were then repeated after 2 and 4 weeks and it was observed that there was no significant difference in both the groups even after 2 and 4 weeks of the initiation of the study, suggesting that power tooth brush although do not have any advantage over the manual one in terms of efficacy, but they can be a useful tool for the group of patients , those who find it difficult to brush their teeth effectively by manual tooth brush.Our results are similar to the results of a systematic review conducted in the year 2004 by Deery C et al[10] they did not found any statistically significant difference between powered and manual brushes.In a study conducted by Robinson P et al[11] they concluded that When compared to manual toothbrushes, powered toothbrushes provide more protection against gum inflammation in the long and they also show better plaque removal in the short term. But our results were not in consistence with them, as per our results there was no significant difference in the Gingival health and the plaque in both the groups in 2 weeks and 4 weeks period. As per the Cochrane review by Niederman R[12], it was observed that some powered toothbrushes with a rotation-oscillation action may achieve a significant, but modest, reduction in plaque and gingivitis compared with manual toothbrushes.

Conclusion

There was no significant difference, between manual and powered tooth brushing in the PI and GI after 2 and 4 weeks of initiation of the study. Hence we conclude that the efficacy of both power and manual tooth brushes are comparable to each other.

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