

# COMPARISON OF THE EFFICACY OF MANUAL TOOTHBRUSH TO POWERED TOOTHBRUSH

Agarwal RR,<sup>1</sup> Khan F,<sup>2</sup> Singh PK,<sup>3</sup> Bhatnagar A,<sup>4</sup> Thakur RK,<sup>5</sup> Arora VK<sup>6</sup>

1. Post Graduate Student, Department of Periodontics, Kothiwal Dental College & Research Center, Moradabad, Uttar Pradesh
2. Post Graduate Student, Department of Prosthodontics, Kothiwal Dental College & Research Center, Moradabad, Uttar Pradesh
3. Post Graduate Student, Department of Periodontics, Kothiwal Dental College & Research Center, Moradabad, Uttar Pradesh
4. Post Graduate Student, Department of Pedodontics, Kothiwal Dental College & Research Center, Moradabad, Uttar Pradesh
5. Professor, Department of Periodontics, Kothiwal Dental College & Research Center, Moradabad, Uttar Pradesh
6. Professor, Department of Periodontics, Kothiwal Dental College & Research Center, Moradabad, Uttar Pradesh

## ABSTRACT

**Objective:** - Crossover study was conducted to compare the efficacy of manual and powered toothbrush on ten dental students in the age group of 20-27 years over a period of 60 days. The aim of the study was to compare the effect of the powered toothbrush (Oral B) and the manual toothbrush (Thermoseal ultra soft) on removal of supragingival plaque and improvement of gingival health.

**Background:** - It is now universally accepted that prevention and inhibition of plaque accumulation on the tooth surface are likely to cause a major breakthrough to achieve optimum periodontal health. In the view of great importance of plaque removal, a number of techniques have been advocated for effective utility of tooth brushing. This study is an endeavor to find out if powered brushing is better than manual brushing.

**Materials and Methods:** - Ten dental student volunteers were selected from Kothiwal Dental College and Research Centre, Moradabad. Students were instructed to use manual toothbrush for one month and then washout period of 15 days was given followed by powered toothbrush for another month. Plaque index was recorded at 15 days interval for 2 months.

**Result:** - Statistical evaluation of the clinical data recorded was carried out. No statistically significant differences at any time comparing the electric and the manual toothbrush were seen in both Group A and Group B.

**Conclusion:** - In general there was no evidence of a statistically significant difference between powered and manual brushes.

**Key Words:** - Manual Toothbrush, Plaque Index, Powered Toothbrush.

## Introduction

Dentistry has evolved using a simple toothpick to today's state of the art technology. Intraoral cleaning device has been a part of human civilization since long. A strong correlation exists between the severity of gingivitis and periodontitis and the accumulation of dental plaque.

There have been many advances in knowledge of the causes of human periodontal diseases, plaque remains the primary initiator or trigger. Dental plaque is implicated in the etiology of dental caries, gingivitis and periodontitis. Therefore, the removal of plaque is thought to play a key role in the prevention of these diseases. The relationship between plaque level (oral hygiene) and periodontal disease is complex and not well understood.<sup>1</sup>

Removal of dental plaque is essential for dental health, and personal oral hygiene is necessary for maintaining periodontal health. Good plaque control preserves oral health. Many clinical studies indicate that the major deposits of plaque form in stagnation area, such as the proximal area, gingival margins and defects in the teeth. These areas are protected from the natural cleansing mechanism of oral tissues.<sup>2</sup> Thus emphasis must be placed on the effectiveness and efficacy of plaque removing devices used to facilitate oral hygiene in these elusive areas.

There are various methods, including chemical (mouthwash) and other mechanical (interdental brushes, dental floss) methods advocate for this purpose, toothbrushing is the most commonly used method. The mechanical method of toothbrushing is the most widely

accepted method of plaque control. Unfortunately effective mechanical methods of plaque control are relatively tedious, time consuming and for many individuals difficult to master.

So, as a modified form of tooth brushing, various forms and designs of powered toothbrushes have been introduced with varying efficiency, acceptability and popularity.<sup>3</sup> Commercial powered (electric) toothbrushes were first introduced in the early 1960s, although, Frederick Wilhelm, a Swedish clockmaker, patented the earliest device in 1855. The mode of action of these brushes is designed to stimulate the manual toothbrushes, but they have established themselves as a superior alternative and user-friendly. However, clinical studies have proved that manual and electric toothbrush are equally effective in removal of plaque and reducing clinical stages of gingival inflammation. Despite several related studies being conducted before there is a paucity of studies to ascertain the superiority of powered over manual toothbrush.

Therefore, this study is planned to get a more detailed knowledge of the effectiveness of each category of toothbrush on maintaining and establishing an effective plaque control on different surfaces of teeth.

## Materials & Methods

A single blind crossover study was designed. The subjects were randomly assigned into two groups by a second examiner, one group using a powered toothbrush and the other group using a manual toothbrush. The study was designed for a period of 60 days, and all volunteers were

instructed to use manual toothbrush for one month and then washout period of 15 days was given followed by powered toothbrush for another month. Plaque index was recorded at 15 days interval for 2 months (0, 15, 30, crossover, 45, 60 days).

Consent for participating in the study was taken from all volunteers. Baseline scoring of plaque index (PI) Rustogi et. al. Modified Navy Plaque Index (1992) using a two-tone disclosing agent was done. The volunteers were not had yet started brushing with the given brushes.

Instructions was given to use only the given brushes to the assigned group twice daily for 2 minutes using the selected toothbrushes technique, with assigned dentrifice only. Scaling was performed for all subjects, thereby making plaque indices score zero.

Volunteers were be refrained from brushing 24 hours before every recall visit and return for periodic examination after every 15 days, that is, on 15<sup>th</sup>, 30<sup>th</sup>, then a crossover of the toothbrushes between the two group, and periodic examination again on the 45<sup>th</sup>, 60<sup>th</sup> day. During each recall visit, plaque indices were be scored. Also, instructions including the brushing technique were be reinstated at each recall visit.

**PATIENT SELECTION**

**Inclusion Criteria**

1. Subjects with good general and oral health.
2. Subjects without any systemic diseases.
3. Subjects who have not received any periodontal therapy for past 3 months.
4. Subjects who have not taken any antibiotics or antiseptic mouthwashes since last one month prior to study.
5. Ability of the subjects to attend the hospital at recall intervals.
6. Subjects with full complement of teeth present except third molars.

**Exclusion Criteria**

1. Subjects with poor manual dexterity.
2. Subjects taking drugs that could affect the state of the gingival tissue.
3. Subjects undergoing orthodontic therapy.
4. Subjects with muco-gingival problems.
5. Subjects using any other supplement plaque control measures like interdental cleansing aids or mouthwashes.
6. Subjects with the habit of taking alcohol, smoking or chewing tobacco.

**Results**

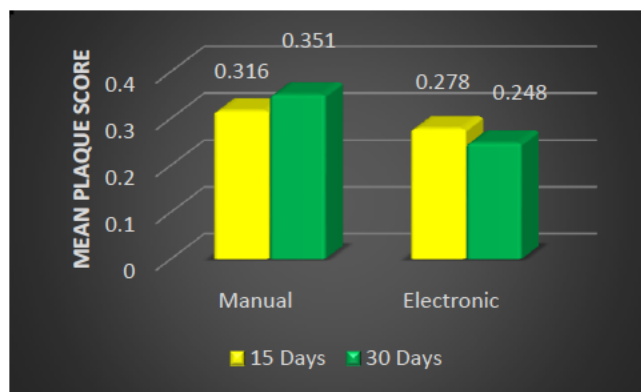
There where a study was conducted, and values was obtained and statistically analysed with the help of SPSS software version 17 and tabulated. In GP A, the mean PI at 15<sup>th</sup> day was  $0.316 \pm 0.232$  and on 30<sup>th</sup> day was  $0.351 \pm 0.138$  which was statistically not significant. An increase of 0.035 in the PI was observed. But this increase was not

significant statistically (Table No.1, Graph No.1) .In GP B, the mean PI at 15<sup>th</sup> day was  $0.278 \pm 0.119$  and on 30<sup>th</sup> day was  $0.248 \pm 0.086$  which was also statistically not significant. A decrease of -0.03 in the PI was observed. But this decrease was not significant statistically (Table No.1, Graph No.1).

Type of brushing	Day of evaluation	Mean plaque score $\pm$ SD	Mean Difference	t-value*	p-value
<b>Gp A: Manual (N=10)</b>	15 <sup>th</sup> Day	$0.316 \pm 0.232$	0.035	- 0.494	0.633 #
	30 <sup>th</sup> Day	$0.351 \pm 0.138$			
<b>GP B: Electronic (N=10)</b>	15 <sup>th</sup> Day	$0.278 \pm 0.119$	- 0.03	0.883	0.400 #
	30 <sup>th</sup> Day	$0.248 \pm 0.086$			

\*paired t-test  
#Statistically not significant

Table 1: - Mean plaque value between two groups at 15 and 30 days



Graph 1: - Mean plaque score at 15 and 30 days of two groups

On the comparison of two the manual and electronic toothbrush at 15<sup>th</sup> day, the mean Difference between the two was 0.038. But it was not significant statistically (Table No.2). At 30<sup>th</sup> day, the mean Difference increased to 0.103, because of more reduction in PI in the group of electronic brush users. Though the difference was not significant statistically (p=0.062) but was very close to significance level (p=0.05). (Table No.2).

Day of evaluation	Comparison Groups	Mean Difference	t-value**	p-value
15 <sup>th</sup> Day	Manual v/s Electronic	0.038	0.466	0.647#
30 <sup>th</sup> Day	Manual v/s Electronic	0.103	1.993	0.062#

\*\*unpaired t-test  
#Statistically not significant

Table 2: - Comparison between two groups at 15 and 30 days

**Discussion**

The present study was performed to evaluate the plaque removal efficacy of a manual and a battery powered toothbrushes. In some clinical studies have demonstrated that power toothbrushes deliver superior plaque removal compared to manual toothbrushes, leading to growing acceptance in the dental community that power toothbrushes offer superior plaque control relative to manual toothbrushes.<sup>1-4</sup> But in our study, both Powered and Manual Toothbrush had equal efficacy in plaque control.

In the present study, students were educated for the brushing technique and using the battery powered brush. Therefore, the manual tooth- brushing group also showed an improvement regarding to plaque removal at the end of the study in comparison to the baseline data.

Trombelli *et al* and Wilcoxon *et al* assessed that plaque scores were lower in patients who used the counter rotary power brush rather than a manual brush by evaluating supragingival plaque for orthodontic patients.<sup>5,6</sup> But in our study efficacy of Powered Toothbrush was equal to Manual toothbrush in removal of supragingival plaque.

The results of the study suggested that conventional battery-powered and manual tooth- brushes are effective in obtaining gingival health. However, other studies reported that electric toothbrushes are considered inferior to manual brushing in removing plaque from the interproximal and lingual tooth surfaces.<sup>2,7-10</sup>

Effective plaque control leads to additional oral health benefits, including reduced gingivitis and stain. The habit of utilizing toothbrush, den- tal floss and mouth rinses, the frequency of den- tal visits, nutrition and environmental factors are causing individual differences in terms of oral and dental health.<sup>11,12,13</sup> Manual or battery- powered toothbrush recommendation depends on the individual's oral status. Patients with high caries activity or periodontal disease and those who are undergoing orthodontic treatment may be advised to use battery-powered toothbrushes for a better-controlled brushing procedure.

**Conclusion**

According to the results obtained, both tooth- brushes' mean difference between baseline and post-brushing plaque scores decreased.

In general, there was no evidence of a statistically significant difference between powered and manual brushes.

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**Corresponding Author**

Dr. Raghu R Agarwal  
 Post Graduate Student,  
 Department of Periodontics,  
 Kothiwal Dental College & Research Center,  
 Moradabad, Uttar Pradesh  
 Email Id: - rgagarwal30@gmail.com