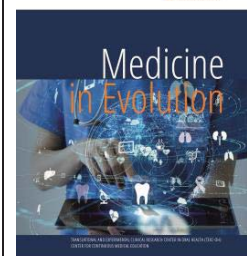


# Manual vs. power toothbrush efficiency on plaque removal in patients with fixed orthodontic appliances



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## Abstract

**Aim and objectives:** The main goal of this study is to compare the efficiency of manual and power toothbrushes in dental plaque removal on patients with orthodontic appliances. **Material and methods:** 30 patients aged from 12 to 29 years were selected for this study, 17 of them being girls/women. Half of them received education for manual toothbrushing and the other half for using power toothbrush. An adapted version of Ciancio plaque score was used for the plaque measurements. **Results:** Patients who used power-toothbrushes seem to have a lower plaque score but the results were not statistically confirmed ( $p > 0.05$ ). **Conclusion:** Using a power-toothbrush may be an advantage during the orthodontic treatment.

**Keywords:** dental plaque, manual toothbrush, power toothbrush, orthodontic appliances

## INTRODUCTION

Orthodontic appliances increase the risk for retaining biofilm and debris, the highest risk of plaque formation being on buccal surfaces, around the brackets, and on interdental areas [1,2]. Moreover, it seems like orthodontic appliances also can make some changes in the oral microbiota like increasing the *Streptococcus* and *Lactobacillus* population which can lead to a high risk of caries and white spots on the teeth due to enamel demineralisation process. The risk of gingivitis and periodontal disease also rises because some species like *Tannerella forsythia*, *Fusobacterium nucleatum* and *Porphyromonas gingivalis* are increased during the orthodontic treatment. *Prevotella nigrescens* is also increased when elastomeric ligatures are used [3,4].

A high-quality oral hygiene must be performed by the patients during the orthodontic treatment, especially a good plaque removal using manual/power toothbrush and interdental cleaning instruments.

### *Aim and objectives*

The main objective of this study is to compare the efficiency of manual and power toothbrushes in dental plaque removal on patients during the orthodontic treatment by using a special plaque score useful in case of orthodontic appliances.

## MATERIAL AND METHODS

The sample consisted from 30 patients with buccal bonded brackets for both arches, aged from 12 to 29 years. 17 of them were girls/women. 15 of the patients received education for manual toothbrushing (Charters method) and 15 for using power toothbrush. The dental appointments were fixed in the first part of the day, between 10 am and 2 pm. So, all the patients were evaluated a few hours after their usual toothbrushing in the morning. Dental disclosing tablets were used for dental biofilm evaluation. An adapted version of the index proposed by the Ciancio at al. was used for the plaque measurements [5,6]. The scores were the followings:

- 0: no plaque on bracket or on tooth surface
- 1: plaque on bracket only
- 2: plaque on bracket, tooth, no extension to gingiva
- 3: plaque on bracket, tooth, extension to papilla
- 4: plaque on bracket, tooth, partial coverage to gingiva
- 5: plaque on bracket, tooth, fully coverage to gingiva

Pictures were taken after every evaluation. Some examples are shown in figure no. 1. The mean value of the index for each patient was calculated by dividing the sum of all scores by the number of the surfaces with brackets (evaluated). The data were entered into a laptop and processed with 24 trial version of SPSS software (Armonk, NY, USA).



Figure 1. Images after dental plaque disclosing

## RESULTS

No patient had the mean score value under 1. The plaque scores are shown in figure 2. An analysis by gender and type of toothbrush is shown in figures no. 3 and 4.

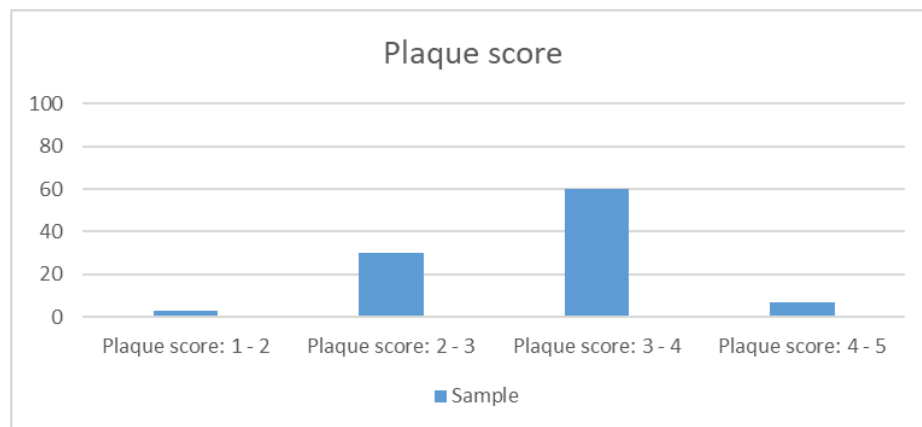


Figure 2. The plaque score for the entire simple

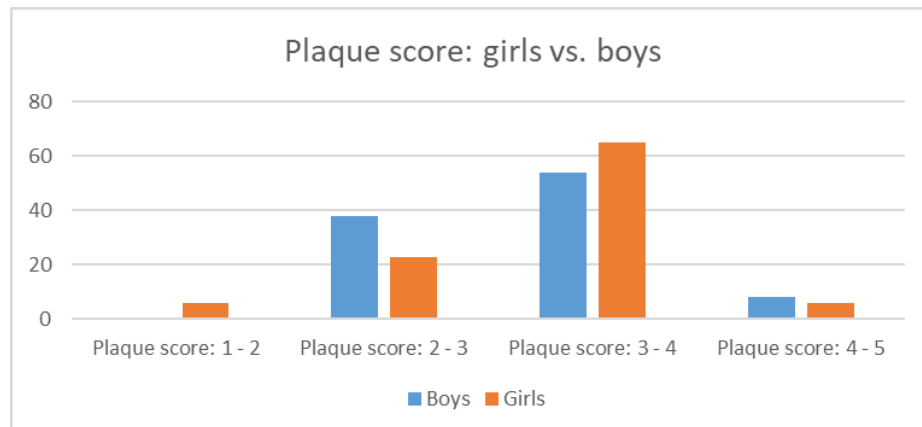


Figure 3. The plaque score for boys and girls

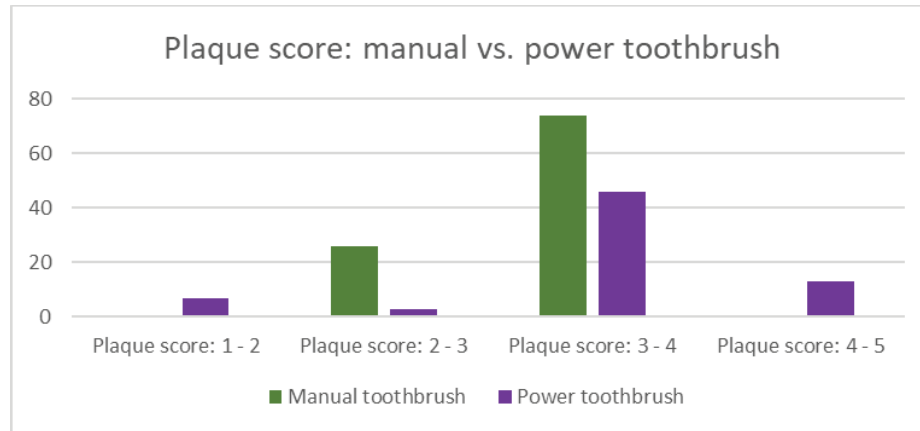


Figure 4. The plaque score after manual and power toothbrushing

The mean value of dental plaque score for the entire sample was 3.13 (SD ± 0.49). The tests (Shapiro-Wilk,  $p = 0.16 > 0.05$ ) showed a normal distribution for dental plaque score. T test was used for comparing differences between gender groups and manual/power toothbrush groups (see table 1):

Table 1. The mean values of the plaque score on different subgroups

Subgroups		Plaque score (mean ± SD)	
Gender	Boys	3.22 ± 0.44	$p = 0.38 > 0.05$
	Girls	3.06 ± 0.53	
Type of toothbrush	Manual	3.18 ± 0.22	$p = 0.54 > 0.05$
	Powered	3.07 ± 0.67	

## DISCUSSIONS

Most of the patients from our study had a medium-high plaque score (between 3 and 4). Even if more girls had medium-high and less of them had medium-low plaque scores (between 2 and 3) than boys, they had lower mean value of the plaque score. However, this “lower mean value” is not statistically confirmed ( $p > 0.05$ ). Many studies developed in Romania [7,8] or in other countries [9,10] showed boys displayed in general worse plaque scores and less good oral hygiene than girls in this age period.

We also found a lower plaque score for the patients who use power toothbrush but again, this result was not statistically confirmed. Many studies from all over the world also exposed no differences in plaque removal for normal individuals using manual and power toothbrush or they found a better plaque score in case of using power toothbrush but with no statistically confirmation [11,12]. However, for patients with orthodontic appliances it seems like using a power toothbrush is better [13].

So, being in the risk category for plaque formation during the orthodontic treatment, these patients must take care a lot about their oral hygiene. Using a power toothbrush, fluoride toothpaste and other instruments for interdental cleaning and cleaning around the brackets is a good strategy for avoiding the high risk of caries and gingivitis.

## CONCLUSIONS

Patients must have a good oral hygiene especially during the orthodontic treatment. Using a power toothbrush may be an advantage.

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