

A Clinical Trial Comparing the Efficacy of an Orthodontic Toothbrush to a Standard Toothbrush among Patients with Fixed Appliance

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Abstract

Aim: To compare the efficacy of an orthodontic toothbrush to a standard toothbrush among patients with fixed appliance.

Objective: To investigate the performance of an orthodontic toothbrush and a standard toothbrush in maintaining the oral hygiene of patients with fixed appliance.

Background: The presence of a fixed appliance in the oral cavity can be a cumbersome process considering the duration of the treatment and the cold metal against the moist oral mucosa. During the course of the treatment, food lodgement between brackets happens almost every time. Therefore, it is utterly important to maintain a good oral hygiene while having a fixed appliance by using proper oral hygiene aids.

Reason: To provide better oral hygiene for patients with fixed appliance.

Keywords: regular toothbrush, orthodontic toothbrush, brushing habits, fixed appliance, brackets, oral hygiene.

Introduction

Oral hygiene is one of the most essential factors in maintaining a healthy oral cavity. Brushing and flossing are two of the most basic habits of a regular household. However, this habit becomes a predicament in patients undergoing fixed appliance therapy. The arch wires and the attachments hamper the tooth cleansing process while accumulating plaque and debris in between the wires. (Zachrisson, 1974; Lundstrom et al 1980).

In this modern developing era, a number of dental supply companies have brought in ideas for customised toothbrushes for orthodontic purposes(1,2). They tend to facilitate the contact of the bristles with the tooth by fitting over the arch wire, which allows the toothbrush to efficiently remove plaque and debris. In this study, the efficacy of orthodontic toothbrush is compared with a regular toothbrush in fixed appliance therapy patients.

It is difficult to explain the apparent superiority of the orthodontic brush for plaque on the anterior teeth rather than the posterior, or combined anterior and posterior teeth(3,4,5). It is also arguable that the gingivitis index is a more valid measure of a particular patient's oral hygiene and hence the performance of a particular tooth- brush, as gingivitis is less variable on a day to day basis than plaque levels. It is therefore question- able whether or not the differences between the two brushes elicited by this study are of

clinical significance, despite the clear subjective preference of the patients for the orthodontic brush(6,7). Ergo, the aim of this clinical trial is to compare the efficacy of an orthodontic toothbrush to a standard toothbrush among patients with fixed appliance.

Materials and methods

A total of 20 patients, of ages ranging from 17 to 25 were chosen from Saveetha Dental College. Among those 20 patients, 10 were male and 10 were female. Patients were chosen based on their requirement to have a fixed appliance procedure performed on them. The patients were given preliminary oral hygiene instructions and were scored for plaque and gingival index. This represented the baseline score, and was designated as score 1.

Further examination was carried out after each the first two weeks of appliance therapy (score 2), during which the patients were each given one toothbrush for two separate weeks on the following basis:

Group 1 patients:

1st weeks—standard toothbrush

2nd week— standard toothbrush

Group 2 patients:

1st week—orthodontic toothbrush

2nd week—orthodontic toothbrush

New brushes were given to the patients each week, starting at the time when the brackets and archwires were fitted. The fixed appliance was placed. The patients were told to use only the allotted brushes with specific brushing techniques. They were also told to bring the toothbrush along with them during their next visit.

This trial was done in 2 weeks and no other cleaning aids like dental floss and interdental brushes were given to the patients.

Table 1: Plaque and gingival index.

Plaque index:	0- No plaque
	1- Plaque visible only when scraped with periodontal probe
	2- Visible plaque on less than one third of the tooth surface
	3- Visible plaque on more than one third of the tooth surface
Gingival index:	0- Normal healthy gingiva
	1- Mild gingival inflammation but no bleeding on probing
	2- Moderate gingival inflammation with bleeding on probing
	3- Severe gingival inflammation and tendency for spontaneous gingival bleeding

Table2: Plaque scoring.

Rating	Score
Excellent	0
Good	0.1-0.9
Fair	1.0-1.9
Poor	2.0-3.0

Table 3:Gingival scoring

Rating	Score
Excellent	0
Good	0.1-0.9
Fair	1.0-1.9
Poor	2.0-3.0

Image 1: Frontal view before arch wire



brackets and arch wire

Image2: Frontal view after placement of placement of brackets and



Results

Table 4: Patients who used standard toothbrush after fixed appliance was placed.

Age	Gender	Plaque index(before)	Gingival index(before)	Age	Gender	Plaque index (after)	Gingival index (after)
21	M	1	1	21	M	0.8	0.7
22	M	1	1	22	M	0.7	0.8
17	F	1	1	17	F	0.8	0.8
20	M	1	1	20	M	0.9	0.8
25	M	1	1	25	M	0.8	0.9
23	F	1	1	23	F	0.6	0.7
24	M	1	1	24	M	0.7	0.8
22	F	1	1	22	F	0.8	0.8
21	F	1	1	21	F	0.7	0.6
18	F	1	1	18	F	0.9	0.8

Figure 1: A bar graph representation of the plaque and gingival index of patients who used standard toothbrush after placement of brackets and arch wire.

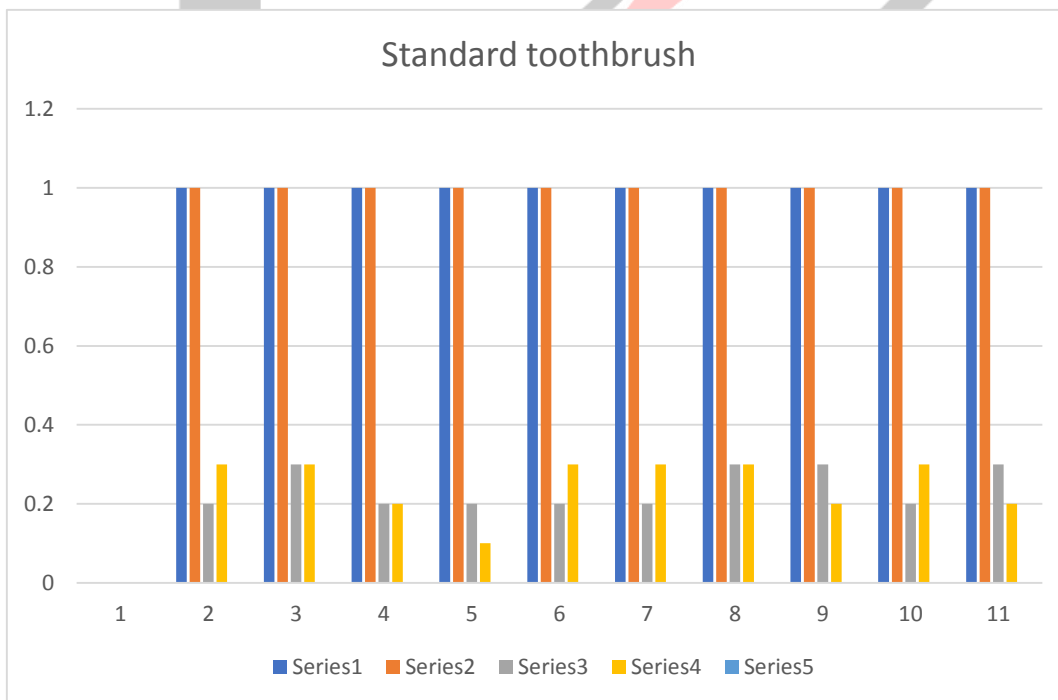
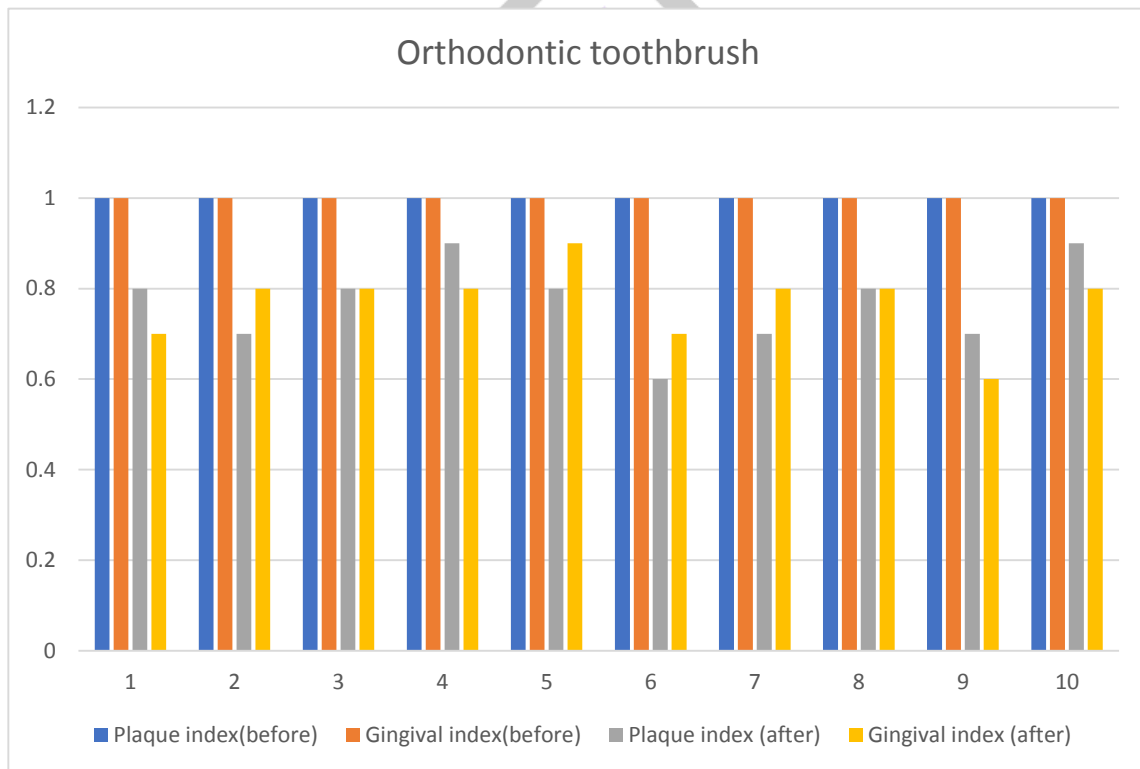


Table 5: Patients who used orthodontic toothbrush after fixed appliance was placed.

Age	Gender	Plaque index(before)	Gingival index(before)	Age	Gender	Plaque index (after)	Gingival index (after)
22	M	1	1	22	M	0.2	0.3
23	M	1	1	23	M	0.3	0.3
18	M	1	1	18	M	0.2	0.2
17	F	1	1	17	F	0.2	0.1
17	M	1	1	17	M	0.2	0.3
22	F	1	1	22	F	0.2	0.3
25	F	1	1	25	F	0.3	0.3
24	M	1	1	24	M	0.3	0.2
24	F	1	1	24	F	0.2	0.3
21	F	1	1	21	F	0.3	0.2

Figure 1: A bar graph representation of the plaque and gingival index of patients who used orthodontic toothbrush after the placement of brackets and arch wire.



Discussion

The results show that the score for plaque index and gingival index for patients who use the standard toothbrush are higher than the plaque index and gingival index for the patients with orthodontic toothbrush. The difference between the initial and final plaque and gingival index in patients who used standard toothbrush is 0.2 whereas the difference between the initial and final plaque and gingival index in patients who used orthodontic toothbrush is 0.8. Hence this shows that the use of orthodontic toothbrushes are far superior in removing debris from the tooth surface of patients with fixed appliance.

The data was collected by patient follow-up. Each patient was analysed based on Silness & loe 1967 plaque and gingival index scoring sheet. This index scoring sheet consists of plaque index scoring sheet and gingival index scoring sheet. The plaque index scoring sheet has a mesial, middle distal, palatal and lingual surface of the upper right first molar, upper right lateral incisor, upper left first premolar, lower right first premolars, lower left lateral incisor, lower left first molar. It also consists of calculations where the plaque index is calculated. It is basically calculated by summing up all individual plaque scores and dividing them by the total number of surfaces examined. The gingival index scoring sheet however is a little more complicated as it requires the mesial, middle, distal, palatal and lingual surfaces of each tooth present in the oral cavity. The calculation includes the total gingival scores of all surfaces of all the teeth and divide the total with the number of teeth examined multiplied by four. 16,12,24,32,36,44 gingival.

The plaque and gingival index were calculated before and after the fixed appliance was applied. The method of scoring for plaque and gingivitis precludes a conventional method error determination(7,8,9,10). A small amount of plaque is inevitably removed during scoring and therefore there is a tendency for the second score to be lower than the first, if taken soon afterwards. With regard to gingivitis, probing the gingival margins to provoke bleeding will increase their tendency to bleed when probed again(11,12,13). The second gingivitis score may thus be higher than the first Nevertheless , an indication of the reproducibility of scoring has been given by charting the number of sites which were given the same scores on both occasions, together with the numbers of sites which were scored higher or lower the second time(15,16,17,18)

It is difficult to explain the apparent superiority of the orthodontic brush for plaque on the anterior teeth rather than the posterior, or combined anterior and posterior teeth. It is also arguable that the gingivitis index is a more valid measure of a particular patient's oral hygiene and hence the performance of a particular toothbrush, as gingivitis is less variable on a day to day basis than plaque levels(19,20). It is therefore questionable whether or not the differences between the two brushes elicited by this study are of clinical significance, despite the clear subjective preference of the patients for the orthodontic brush.

Conclusion

The clinical trial conducted shows that the orthodontic toothbrush is a far better option compared to a standard toothbrush in patients with fixed appliance because it helps reduce debris on the tooth.

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