



COMPARATIVE CLINICAL EVALUATION OF THE DENTAL PLAQUE REMOVING ABILITY OF CHEWABLE TOOTH BRUSH VS MANUAL TOOTH BRUSH IN MIXED DENTITION PERIOD CHILDREN

Dr Lokesh S*	Senior Lecturer, Department of pedodontics, Adhiparasakthi Dental College Melmaruvathur, India - 603319. *Corresponding Author
Dr Vasanthakumari A	Professor and Head, Department of pedodontics, Adhiparasakthi Dental College Melmaruvathur, India - 603319.
Dr Jaiganesh I	Senior Lecturer, Department of pedodontics, Adhiparasakthi Dental College Melmaruvathur, India - 603319.
Dr Vivek K	Senior Lecturer, Department of pedodontics, Adhiparasakthi Dental College Melmaruvathur, India - 603319.
Dr Vivek Reddy	Senior Lecturer, Department of pedodontics, Adhiparasakthi Dental College Melmaruvathur, India - 603319.

ABSTRACT

PURPOSE: Dental plaque is considered to be one of the etiological factors in causation of dental caries, gingivitis and periodontitis. Efficient plaque control is essential for maintaining good gingival and periodontal health, prevention of dental caries and to preserve the oral health.

AIM: The aim of the present study is to compare the ability of dental plaque removal of chewable brush with manual tooth brush.

MATERIALS AND METHODS: A total of 60 students were selected from the same school in mixed dentition period and divided in to 2 groups, Group I: Manual tooth brush and Group II: Chewable tooth brush, 30 students in each group. Dental examination was carried out to check Oral Hygiene Index Simplified (OHI-S), and Plaque index score by Turesky modification of the Quigley Hein Plaque Index (TMQHPI) for amount of plaque and Silness Loe Plaque Index (SLPI) for plaque thickness, preoperative and 7 days post operative scores was obtained, data's were statistically analyzed using Mann Whitney U test and Paired students 't' test.

RESULTS: The mean plaque reduction was found to be statistically significant ($p < 0.0001$) in OHI-S score and TMQHPI, SLPI plaque index score, but on comparing between the groups scores were found to be not statistically significant ($p > 0.05$), means that both were equally effective.

CONCLUSION: Chewable brush was found to be as effective as a manual brush in removing plaque. We can suggest that chewable brush may be an appropriate oral hygiene adjunct for children, including children with reduced manual dexterity.

KEYWORDS : Chewable brush, Manual brush, Plaque Index, Mixed dentition, Oral hygiene.

INTRODUCTION

Tooth brushing is one of the most easiest and cost-effective method of removing dental plaque.1 Dental plaque is a biofilm formed on the surfaces of the tooth and restorations present in the oral cavity. Dental plaque is considered to be one of the etiological factors in causation of dental caries, gingivitis and periodontitis.2 Efficient plaque control is essential for maintaining good gingival and periodontal health, prevention of dental caries and to preserve the oral health.3

Zimmermann et al reported that a low frequency of tooth brushing will increase the risk of periodontitis.4 Various chemical and mechanical methods are available commercially for the removal of plaque.5 Manual tooth brush remains the primary method of maintaining good oral hygiene in majority of the population. Effective tooth brushing requires certain degree of manual dexterity, which increases only with age. A recent innovation for plaque removal is the discovery of chewable tooth brush.6

A chewable toothbrush (Rolly mini tooth brush) was developed as an alternative to a manual toothbrush, contains fluoride - at low concentration is bacteriostatic and at high concentration it is bactericidal, Xylitol - a non-sugar sweetener used in foods is non-cariogenic and has cariostatic effect and aroma mint - a flavouring agent.

The aim of the present study is to compare the ability of dental plaque removal of chewable brush with manual tooth brush.

MATERIALS AND METHODS

A total of 60 students were selected which includes both male and female in a same school, those who were willing to participate and who is free of systemic disease, mentally healthy with good oral

hygiene means free of caries in mixed dentition period and not under any medications (antibiotics) for the past one month. After screening they were included in the study. The study was explained to the parents and students and the informed consent is obtained.

They were randomly divided into 2 groups,

Table: 1 Division of Groups

GROUPS	TYPE OF BRUSH	NUMBERS
GROUP - I	MANUAL TOOTH BRUSH	30
GROUP - II	CHEWABLE TOOTHBRUSH	30

DENTAL EXAMINATION:

Prior to each use of the chewable and manual toothbrushes, Oral examination was carried out using mouth mirror and probe. Both OHI-S and plaque index score were recorded to know the effectiveness of any tooth brush. Pre operative score of all students, OHI-S score was obtained by adding debris index (DI-S) and calculus index (CI-S).

Dental plaque index was assessed using Turesky modification of the Quigley Hein plaque index (TMQHPI) for amount of plaque follows : 0, dental plaque was not present; 1, isolated areas of dental plaque; 2, band of dental plaque less than 1 mm; 3, dental plaque covered up to 1/3 of the tooth surface; 4, dental plaque covered between 1/3 and 2/3 of the tooth surface; and 5, dental plaque covered more than 2/3 of the tooth surface.7

Silness-Loe plaque index (SLPI) for plaque thickness follows: 0, dental plaque was not present; 1, a film of dental plaque adheres to the proximal surface and gingival margin of the tooth and is visible with the naked eye after the use of a disclosing solution or confirmed with an explorer; 2, a moderate amount of dental plaque

adheres to the tooth surface, gingival margin, or gingival crevice; and 3, a large amount of dental plaque adheres to the gingival margin or crevice were recorded.8

All students in Group I - receives manual tooth brush, participants were instructed to brush the teeth by fones method (Fig 1) for 3 minutes using regular paste and Group II - receives chewable brush, the participants were trained to roll the chewable toothbrush (Fig 2) inside the mouth continuously for 3 minutes does not need toothpaste as if chewing gum according to the manufacturer's instructions, for both the groups two times a day for 7 days.



Fig 1: Manual and chewable brush



Fig 2: Patient using chewable brush

After 7 days, again the oral examination was carried out by the same examiner to assess the OHI-S score and dental plaque index score and the values were recorded using the same criteria mentioned above.

Average of pre operative and post operative brushing scores was calculated and data were evaluated using Mann whitney U test and paired student t - test using SPSS version 16 with the p-value of $p < 0.05$ as significant.

RESULTS

The participated 60 students were divided in to 2 groups as shown in table 1. The mean age of students included in the study is 8.3. The mean amount of plaque reduction for TMQHI was found to be statistically significant (p-0.0001) and their comparison is not statistically significant (p-0.9242) in both groups as shown in table 2 and table 4 respectively.

The mean amount of plaque reduction for SLPI was found to be statistically significant (p-0.0001) and their comparison is not statistically significant (p-0.8610) in both groups as shown in table 3 and table 4 respectively.

The pre and post operative OHI-S score mean amount was found to be statistically significant (p-0.0001) and their comparison is not statistically significant (p-0.2046) in both groups as shown in table 5.

Table 2 – Mean of TMQHI in Group I and II by Mann whitney U test

GROUPS	Nos	PRE OPERATIVE	POST OPERATIVE	PLAQUE REDUCTION	P - VALUE
GROUP - I	30	MEAN = 0.77	MEAN = 0.36	0.41	0.0001(S)
		SD = 0.42	SD = 0.33		
GROUP - II	30	MEAN = 0.75	MEAN = 0.40	0.40	0.0001(S)
		SD = 0.41	SD = 0.34		

Table 3 – Mean of SLPI in Group I and II by Mann whitney U test

GROUPS	Nos	PRE OPERATIVE	POST OPERATIVE	PLAQUE REDUCTION	P - VALUE
GROUP - I	30	MEAN = 0.80	MEAN = 0.35	0.45	0.0001(S)
		SD = 0.42	SD = 0.29		
GROUP - II	30	MEAN = 0.79	MEAN = 0.32	0.47	0.0001(S)
		SD = 0.31	SD = 0.34		

Table 4- Comparison of plaque reduction efficiency of both Groups by TMQHI and SLPI

GROUPS	Nos	GROUP - I	GROUP - II	t - VALUE	P - VALUE
TMQHI	30	0.41±0.38	0.40±0.45	0.0956	0.9242(NS)
SLPI	30	0.45±0.41	0.47±0.44	0.1758	0.8610(NS)

Table 5 - Inter and Intra group comparison of OHI-S scores of pre and post operative use of chewable and manual tooth brush

GROUPS	Nos	PRE OPERATIVE	POST OPERATIVE	"t" VALUE	P - VALUE
GROUP - I	30	MEAN = 0.66	MEAN = 0.32	1.2831	0.2046(NS)
		SD = 0.259	SD = 0.139		
		0.0008 (S)			
GROUP - II	30	MEAN = 0.68	MEAN = 0.22		
		SD = 0.249	SD = 0.108		
		0.0001(S)			

DISCUSSION

Dental plaque is one of the most common factors to cause dental caries and periodontal diseases. Dental caries remains to persist as a serious oral health problem and is more prevalent in children. This can be attributed to factors such as high intake of sugars, inability of the young children to brush their teeth properly and lack of oral health education.9

Understanding about the mechanism of formation of plaque is essential for development of control measures for these diseases.10 Effective tooth brushing depends on the toothbrush, brushing time, manual dexterity, motivation and ability to follow instructions. Retention of the food and lowered buffering action of the saliva decreases the plaque pH, favours the growth of acidogenic and aciduric bacteria, increasing the risk of demineralization. On the other hand, when the plaque pH increases, super-saturation of the calcium and phosphorous is found in biofilm and saliva, restoring the lost minerals of the enamel by a process called remineralization.11

The present study results showed overall plaque reduction scores in TMQHI the amount of plaque was significantly reduced and showed statistically significant with both the chewable and manual tooth brush (Table 2), which is similar to the results of Moon jin Jeong et al(2017) and Myoken et al(2016), but on comparing the groups it found the scores are not statistically significant (Table 4) it means both groups equally effective in removing plaque, which is similar to the results of Myoken et al.12

The plaque reduction rate by SLPI, the thickness of plaque was significantly reduced and showed statistically significant with both the chewable and manual tooth brush (Table 2), but on comparing the groups it founds not statistically significant (Table 4) differences between the two brushes which is similar to the results of Moon jin Jeong et al(2017).13

Evaluating the OHI-S score of pre operative and post operative in both the groups was found to be statistically significant, same results obtained by Lavanya Govindaraju et al(2017), but still no comparison was made between the chewable and manual tooth brush, on comparing the groups are not shown statistically significant difference between them.

Added advantage of chewable brush used in this study contains xylitol. It has been suggested that daily exposure to xylitol may be beneficial to child dental health by reducing caries and assisting remineralization.

CONCLUSION

The present study, shows that chewable brush was found to be as effective as a manual brush in removing plaque. It can be suggested that chewable brush may be an appropriate oral hygiene adjunct for children, including children with reduced manual dexterity. It also proved to be most vital and valuable tool to assess and evaluate oral hygiene status in children which can be interpreted in further research and studies

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