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Effectiveness of different tooth brushing techniques and teaching methods on the removal of dental plaque in school children

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Abstract

Aims: To evaluate the effectiveness of different brushing techniques demonstrated on the cast and by audiovisual methods for the removal of dental plaque in school children.

Materials and Methods: Total of 90 healthy children aged between 3 to11 years were randomly selected from various schools of Anjora, Durg, Chhattisgarh. They were equally divided into three groups. Children in each group were demonstrated only one of the three brushing techniques, viz. horizontal scrub technique (Group A), Fones technique(Group B), and modified Bass technique(Group C), using a cast model and by audiovisual method. All the children were examined and baseline plaque index was recorded. They were re-examined and reviewed after 1 week and plaque index was reassessed to obtain the follow-up data.

Results: Statistically significant ($p < 0.001$) reduction in plaque score was seen in modified Bass technique.

Conclusion: Modified Bass technique was found to be the most effective brushing technique in children.

Keywords: Dental plaque, Tooth brushing techniques, Tooth brushing teaching methods

Introduction

The dental caries is the most common dental problem in school going children. Dental plaque is known to be major causative agent of many of the dental diseases such as caries and periodontal disease. Plaque as an etiologic agent was first acknowledged by **Loe H et al. (1965)** in his study, where it was established that there was development of gingivitis within a few days of discontinuing the oral hygiene practices. This situation is attributed due to the shift to gram negative plaque flora, and it was noted that gingivitis was reversible when patients resumed their oral hygiene practice. The use of preventive measures to maintain optimum oral health in children is a major concern of the dental practitioners. The much needed element in a preventive dental program, for both the individual and the group, is a well-organized plaque control program. The fundamental of this preventive procedure including the mechanical and chemical plaque control measures is comprehensive home oral hygiene. Supposing that tooth brushing plays a vigorous role in an effective plaque control program, good oral hygiene would be dependent upon the effectiveness of the specific technique and the ease with which the procedure is carried out.[1] This study was undertaken to evaluate the tooth brushing techniques, demonstrating methods, duration and frequency and also to assess the types of brush used and different brushing grips.

Materials and Methods

In this randomized controlled clinical trial, a total of 90 healthy children studying in 1st to 6th standard with the age ranging from 3-11 years were randomly selected from two schools of Durg district, Chhattisgarh, India. Ethical clearance to conduct the study was obtained from the institutional ethical committee of Maitri College of dentistry and research centre, Durg. The children aged between 3-11 years comprising of both genders with no dental caries, those who were co-operative and ready to participate were included in the study while children with orthodontic or prosthodontics appliances, children with dental caries, periodontal involvement, oral infections and children those were handicapped, medically compromised and having any systemic diseases were excluded from study.

Before initiation of the study, permission was obtained from the concerned school authorities. The procedure was fully described to the parents/guardians of all the children included in the study and their informed consent was also obtained prior to the study.

Oral examination was accomplished under natural daylight using a mouth mirror and an explorer. A brief case history of each children enrolled for the study was recorded.The children those satisfying both inclusion and exclusion criteria were stratified according to brushing techniques into 3groups (group A, group B, and group C). The isolation of teeth of each children was done and were dried using cotton rolls, and disclosing solution (PLAK-CHECK plaque disclosing solution; Vishal Dentocare Manufacturers, Bangalore, India) was applied. The children were asked to rinse their mouth with water to disclose plaque prior to the plaque index recording. Assessment of plaque using Sillness and Loe plaque index was carried out in all the children to obtain the baseline data. The brushing grip, brush type, duration and frequency of brushing were also recorded of each child of all the 3 groups. Children in each group were demonstrated only one of the three brushing techniques,

viz. horizontal scrub technique in group A (3-5 years), Fones technique in group B (6-8 years), and modified Bass technique in group C (9-11years). They were also stratified according to demonstration of brushing method where half of the children were demonstrated by using cast model and another half by using audiovisual methods of each group. Later, the children were asked to brush their teeth using the technique demonstrated to them in front of mirror, which was supervised. They were suggested to brush their teeth twice daily once in the morning and once at night before going to bed. All the children were re-examined and reviewed after 1 week and plaque index was re-assessed to obtain the follow-up data. The results were compared with the baseline data and statistical analysis was carried out using paired t test and intergroup comparison was made using analysis of variance (ANOVA) test.

Results

In the present study 90 children were enrolled of which 54 were females and 36 males (Table 1).These children were divided into three groups (group A, group B, and group C) each comprising of 30 children. In each group brushing technique were demonstrated to half of children by using cast model and others by using audiovisual methods (Table 2).

The mean baseline mean plaque score for Horizontal scrub, fones and Modified bass technique by using cast model method was 1.59, 1.67 and 1.58 respectively which were reduced to 1.27, 1.45 and 1.24 respectively after 1 week. This difference in reduction of mean plaque score was found to be statistically highly significant with $p<0.001$ (Table 3). There was reduction in mean plaque score after demonstration using cast model method was more in modified bass group (0.34) as compared to horizontal scrub group (0.32) and fones group (0.22). This difference in reduction of mean plaque score was found to be statistically highly significant with $p<0.001$(Table5).

The mean baseline mean plaque score for Horizontal scrub, fones and Modified bass technique by using audiovisual method was 1.65, 1.60 and 1.62 respectively which were reduced to 1.37, 1.56 and 1.32respectively after 1 week. This difference in reduction of mean plaque score was found to be statistically highly significant with $p<0.001$ (Table 4). It was noticed that there was reduction in mean plaque score after demonstration using audiovisual method was more in modified bass group (0.30) as compared to horizontal scrub group (0.28) and fones group (0.04). This difference in reduction of mean plaque score was found to be statistically highly significant with $p<0.001$(Table 5).

The differences between Mean plaque score before and after the demonstration of horizontal scrub, Fones and Modified bass by using cast method were 0.32, 0.22 and 0.34 respectively and by using audiovisual method were 0.28, 0.04 and 0.30 respectively. It was noticed that reduction in mean plaque score was more in all the 3 groups by cast model method as compared to audiovisual method which was found to be statistically highly significant with $p<0.001$(Table 5).

In the present study we also tried to find out the different brushing grip used by the children while brushing their teeth and it was observed that maximum number of children used distal oblique grip followed by oblique and power grip.

We also tried to find out different type of tooth brush used by the children for tooth brushing and it was observed that maximum number of children used adult type of toothbrush.

We also tried to find out the duration and frequency of brushing used by the children and it was observed that

maximum number of children brushes their teeth for about 1-1.5 minutes and once a day.

MALE	FEMALE	TOTAL
36	54	90

Table 1: Distribution of subjects according to gender

GROUP	BRUSHING TECHNIQUE	AGE	CAST METHOD	AUDIOVISUAL METHOD	TOTAL
A	Horizontal scrub	3-5 years	15	15	30
B	Fones	6-8 years	15	15	30
C	Modified bass	9-11 years	15	15	30
Total no. of subjects					90

Table 2: Distribution of subject according to method of demonstration of brushing technique

	Cast model method			
Study group	Brushing technique	Baseline plaque Index Score (Mean ± S.D.)	After demonstration plaque Index score (Mean ± S.D.)	p value
Group A1	Horizontal scrub	1.59 ±0.10	1.27 ±0.10	0.000 (p<0.001) Statistically Very Highly Significant
Group B1	Fones	1.67 ±0.08	1.45 ±0.11	
Group C1	Modified bass	1.58 ±0.06	1.24 ±0.07	

Table 3: Comparison of Mean plaque index score before and after demonstration of horizontal scrub, Fones and Modified bass technique by using cast model method.

	Audiovisual method			
Study group	Brushing technique	Baseline plaque Index Score (Mean ± S.D.)	After demonstration plaque Index score (Mean ± S.D.)	p value
Group A2	Horizontal scrub	1.65 ±0.07	1.37 ±0.15	0.000 (P<0.001) Statistically Very Highly Significant
Group B2	Fones	1.60 ±0.07	1.56 ±0.11	
Group C2	Modified bass	1.62 ±0.08	1.32 ±0.10	

Table 4: Comparison of Mean plaque index score before and after demonstration of horizontal scrub, Fones and Modified bass technique by using audiovisual method.

Brushing technique	Difference between mean plaque Score before and after the demonstration by cast model method	Difference between mean plaque Score before and after the demonstration by audio-visual method	p value
Horizontal scrub method	0.32	0.28	0.000 (p<0.001) Statistically Very Highly Significant
Fones method	0.22	0.04	
Modified bass method	0.34	0.30	

Table 5: Comparison of differences between Mean plaque score before and after the demonstration of horizontal scrub, Fones and Modified bass by using cast method and Audiovisual method.

Discussion

Good oral hygiene is the basic need for maintaining a good health. Tooth brushing is the most common method used to maintain oral hygiene. It is expected that over 90% people naturally use vigorous vertical, horizontal or other circular motions similar to scrub technique.[2]

In present study, it was observed that modified Bass was found to be most effective brushing technique in the reduction of plaque score, horizontal scrub was the second effective technique and least one was Fones. It was also observed that Cast model method was more effective than audiovisual method in reduction of plaque score. Distal oblique brushing technique was the most preferred grip by the children followed by power and oblique. It was also observed that most of the children used adult type of toothbrush brushes their teeth for 1-1.5 mins and once a day.

McClure DB (1966)[3] conducted a study to compare different tooth brushing techniques in preschool children and found that horizontal scrub was an effective technique for tooth brushing in preschool children. The relative efficacy of different tooth brushing techniques i.e. Fones, modified bass and horizontal scrub was evaluated in this study. Most uninstructed people do use horizontal scrub

motion for tooth brushing. In our study, it was also observed most of the participants were seen using variation of horizontal scrub method.

Developed motor movement and learned manual dentistry for tooth brushing are mostly progressed in young ages i.e. 8 years above. Different methods for tooth brushing are recommended for children of different age groups i.e. for preschool children, horizontal scrub is efficient and for children with mixed dentition Fones method and for modified bass method both is considered.[2]

IIyas M et al. (2018)[2] conducted a study to ascertain the efficacy of horizontal scrub, Fones and modified bass brushing techniques and concluded that Modified Bass was found to be most effective brushing technique in the reduction of plaque score with $p < 0.001$, horizontal scrub was the second effective technique and least one was Fones.

Patil SP et al. (2019)[1] also found that statistically significant ($p< 0.001$) reduction in plaque score was seen in modified Bass technique followed by horizontal scrub technique and the least efficacy was seen in Fones brushing technique.

Our result is accordance with above studies as we also found Modified Bass technique as most effective in the plaque removal.

Srivastava N et al.(2013)[4] suggested that individual cast instructions are more effective than audio visual instructions. In our result we also observed that Cast model method is more effective than audiovisual method in reduction of plaque score.

Okada M et al. (2000)[5] conducted a study and it was observed that learning of brushing techniques is an important factor, as brushing under guidance have better results. That is why in this study each child was demonstrated individually a specific technique on dental cast/model.

In the present study, the most common brushing grip used by the children was the distal oblique grip that is in accordance with **Beals D et al. (1999)[6] , Mentes A and Atukeren J (2002)[7].**

Conclusion

- Modified Bass was found most effective in the reduction of plaque score, horizontal scrub was the second effective technique and least one was Fones.
- Cast model method is more effective than audiovisual method in reduction of plaque score because learning of brushing techniques is an important factor. So brushing under guidance has better results.
- Distal oblique was the most preferred brushing grip by the children followed by power and oblique.
- The children and their parent needs to be educated:

1. For the use of proper type of toothbrush for children.
2. To brushes their teeth for 2 mins.
3. To brushes their teeth twice daily.

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