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Research Article

Evaluation of efficacy of various types of toothbrush grips used to remove dental plaque by visually impaired children

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Abstract: The aim of present study is to evaluate the efficacy of various types of toothbrush grips used to remove dental plaque by visually impaired children. Hundred visually impaired child including boys and girls aged 3-12 years were selected for the study who all are staying at Badhir Vidyalaya Ambamata Udaipur. Children were divided in to three groups according to age: 3-6 years, 7-9 years and 10-12 years. We then investigated the association between grip type and plaque removal, using plaque scores obtained before and after brushing. In result, it is found that he most common grip used was distal oblique with more efficient plaque removal and Precision grip being the least efficient in all age groups. The statistical data was significant with p=0.000 and Mean brushing duration for most children was 2.19 min. Distal oblique grip and less than 2 min duration of brushing has more plaque removal efficacy and there was no significance found in plaque removal among different age group.
Keywords: Brushing, grip, plaque, visually impaired children.

INTRODUCTION

Tooth brushing is the most practical and effective means of achieving and maintaining adequate oral hygiene. Dental plaque being the cause of various dental and periodontal problems must be removed effectively. Only tooth-brushing methods and good dentifrices will not help to remove the dental plaque. Therefore, it is necessary to know the duration and proper toothbrush grip for effective oral hygiene [1].

Blindness is defined by WHO as having a 'visual acuity of less than 3/60 m or corresponding visual field loss in the better eye with the best possible correction' meaning that whilst a blind person could see 3 m, a non‑visually impaired person could see 60 m. Visual impairment relates to a person's eyesight which cannot be corrected to normal vision [2]. As per census 2001, there are about 21 million people with disability in India [3].

Oral disease is a major health problem for adults with disabilities [4], who have a higher prevalence and severity of oral disease when compared to the general population [5]. High rates of dental caries, missing teeth, periodontal disease, and prolonged retention of primary teeth, misaligned or supernumerary teeth and malocclusion are all indicators of poor oral health in adults with disabilities [6]. The main reason for higher prevalence of dental caries in disabled individuals is the inadequate plaque removal. Visually impaired cannot visualize the plaque on the teeth surfaces so even understanding the importance of oral hygiene is difficult for them, which results in the progression of dental caries as well as inflammatory disease of the periodontium [7].

AIMS AND OBJECTIVES

The aims of this study was to evaluate the tooth brushing ability in visually impaired children aged between 3 to 12 years and its relation to types of grip use and the duration of brushing.

MATERIALS AND METHOD

Hundred visually impaired child including boys and girls aged 3-12 years were selected for the study who all are staying at Badhir Vidyalaya Ambamata Udaipur. Materials used were used for the study are questionnaire forms, Disposable gloves and mouth mask, Mouth mirror, Straight probe, Disclosing Agent, Explorer, Tooth paste, Medium hard, Multitufted, nylon bristled tooth brush, Face mirror. Children aged 3-12 years with a quadrant consisting of six teeth in primary, mixed, or permanent dentition were participate in the study. Children with neuromuscular disorders, hearing impairment and mental impairment were excluded from the study. Participating children were asked to avoid tooth brushing in the evening and morning before clinical

examinations. Children were divided in to three groups according to their age: Group-1 = 3-6 years, Group-2 = 7-9 years and Group-3 = 10-12 years. A questionnaire was filled and plaque score was recorded according to Silness and Loe in 1964. The participants were asked to brush; the type of grip used and duration of brushing were recorded without the knowledge of the participant. After brushing again, disclosing agent was applied and plaque score was recorded. The manual dexterity of the children was evaluated according to Beals *et al*. (Distal Oblique, Oblique, Precision, Power, and Spoon). Data were collected and Statistical analysis was done using SPSS version 17.0 and ANOVA test.

RESULTS

Among the 100 participant children, most common grip used was distal oblique with more efficient plaque removal with 0.5665 as mean value and Precision grip being the least efficient (Table 1). There was significance difference between grips and plaque removal efficacy (Table 2). Plaque removal efficacy was on higher side in the subjects brushing for less than 2min with 0.5715 mean (Table 3) and the result was significant between the group and within the group (Table 4). There was no mean difference between age groups and plaque removal efficacy (Table 5) and there was no Statistical significance found in plaque removal among different age group (Table 6). The mean brushing time was 2.19 min in 100 uninstructed participate (Table 7).

Table 1: Various grips and plaque removal efficacy

Grips	N	Mean	Std.Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower	Upper		
Oblique	23	0.4804	0.17259	0.03599	0.4058	0.5551	0.25	0.83
Spoon	11	0.3409	0.11606	0.03499	0.2629	0.4189	0.21	0.49
Precision	9	**0.3122**	0.13386	0.04462	0.2093	0.4151	0.10	0.43
Distal Oblique	34	**0.5665**	0.21601	0.03705	0.4911	0.6418	0.25	1.09
Power	23	0.4596	0.10494	0.02188	0.4142	0.5049	0.23	0.66
Total	100	0.4744	0.18647	0.01865	0.4374	0.5114	0.10	1.09

Table 2: Significance difference between groups and within groups

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.727	4	0.182	6.357	**0.000**
Within Groups	2.715	95	0.029		
Total	3.442	99			

Table 3: Duration and plaque removal efficacy

Duration	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower	Upper		
<2min	40	**0.5715**	0.19239	0.03042	0.5100	0.6330	0.25	1.09
2min	1	0.4300	.	.	.	.	0.43	0.43
>2min	59	0.4093	0.15368	0.02001	0.3693	0.4494	0.10	0.84
Total	100	0.4744	0.18647	0.01865	0.4374	0.5114	0.10	1.09

Table 4: Significance difference between groups and within groups

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	0.629	2	0.314	10.843	**0.000**
Within Groups	2.813	97	0.029		
Total	3.442	99			

Table 5: Age groups and plaque removal efficacy

Age	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower	Upper		
3 to 6	30	0.4287	0.14095	0.02573	0.3760	0.4813	0.25	0.78
7 to 9	30	0.4967	0.22423	0.04094	0.4129	0.5804	0.21	1.09
10 to12	40	0.4920	0.18384	0.02907	0.4332	0.5508	0.10	0.83
Total	100	0.4744	0.18647	0.01865	0.4374	0.5114	0.10	1.09

Table 6: Significance difference between groups and within groups

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	0.090	2	0.045	1.302	**0.277**
Within Groups	3.352	97	0.035		
Total	3.442	99			

Table 7: Mean duration at different age

Age	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower	Upper		
3 to 6	30	2.20	0.997	0.182	1.83	2.57	1	3
7 to 9	30	2.37	0.928	0.169	2.02	2.71	1	3
10 to12	40	2.05	1.011	0.160	1.73	2.37	1	3
Total	100	**2.19**	0.982	0.098	2.00	2.38	1	3

DISCUSSION

The removal of plaque and debris from the teeth is a skill that can be mastered only when an individual has the dexterity to manipulate the toothbrush and understands the objectives of these activities [8]. Chang and Shih found that students with visual impairments were less knowledgeable about their oral care. In the present study, in contrast to the former, the study population had better knowledge regarding dental healthcare. Majority of them knew the basic preventive aspects regarding oral health [9].

In this study, the most common grip used was distal oblique, which was found to be most efficient in plaque removal. This finding is similar to the study, which was conducted by Beals et al.[10], Mentes and Atukeren [11] and Sharma et al [12]. Macgregor and Rugg-Gunn [13] found that overall brushing time was 1.3 min in 85 uninstructed children aged 11-13 years. Das UM and Singhal P [14] reported a mean brushing time of 1.27 min among children aged 9-11 years. In the present study, overall brushing time was 2.19 min and the plaque efficacy was found to be more in children who brush their teeth less than 2 min. Several studies [13,15,16] reported that horizontal scrubbing was the method of choice among young children and that they were unable to use other tooth brushing methods.

CONCLUSION

After conducting a survey and analyzing the results, it can be concluded that visually impaired individuals have moderate to low grade of oral hygiene, with very high rate of caries prevalence. Distal oblique grip and less than 2 min duration of brushing has more plaque removal efficacy. There was no statistically significance difference between age group and the plaque removal efficacy.

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