

The Significance of Brushing Time In Removing Dental Plaque

Research Article

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Abstract

Microbial biofilms are mainly implicated in etiopathogenesis of caries and periodontal disease. Owing to its properties, these pose great challenges. Continuous and regular disruption of these biofilms is imperative for prevention and management of oral diseases. This study was done to understand the relationship between brushing time and plaque removal, in an untutored general population using a conventional manual toothbrush and dentifrice.

Methods: The present study was undertaken to measure plaque removal by brushing over time periods between 30, 45, 60, 120 and 180 seconds with 1.5g dentifrice.(FULLSTOP) colgate 360° whole mouth clean tooth brush and Colgate total tooth paste were used in this study. Fourty subjects participated in the study, in which plaque level was assessed using the Quigley-Hein (Turesky-modification) Index.

Results: The study showed increased plaque removal with increased brushing time,Plaque removal significantly improved while brushing for 180 seconds when compared to brushing for 30 seconds.

Conclusions: Oral health care professionals should motivate patients to brush for longer periods of time. A minimum duration of 2 minutes or more should be advised to the patients instead of 45 seconds.Special emphasis should be given in motivating all patients to brush of 2 minutes or more for plaque removal. Patients undergoing orthodontic treatment should also be advised for brushing for the stipulated time as plaque retention in such patients can hamper the final result.

Introduction

Self-performed mechanical plaque removal is one of the most accepted methods of controlling plaque and gingivitis. Despite the wide range of methods available, mechanical plaque removal with a manual toothbrush remains the primary method of maintaining good oral hygiene for a majority of the population. When performed well, for an adequate duration of time, manual brushing is highly effective for most patients.

The Council of Dental Therapeutics has quoted, "In fact, the data from some studies emphasize the ability of persons to maintain good oral hygiene through effective use of a conventional toothbrush if they possess reasonable dexterity and have been trained adequately in the proper use of the brush". Studies on the relationship between time spent on brushing and oral hygiene have been inconsistent [1]. Two factors that influence the effectiveness of any toothbrush are the amount of force applied and the length of time for which it is used [2]. Hawkins et al., (1986) evaluated

the plaque reduction of a manual toothbrush over four different brushing times. They suggested that there was a 'monotonic' progression of plaque reduction as the brushing time increased. Most oral health care professionals suggest that individuals should spend at least 2 minutes brushing their teeth with an effective technique at least twice a day, However, most estimates of actual brushing time vary between just over 30 seconds to 60 seconds [3]. The aim of this study was to determine whether brushing time is an important determinant for plaque removal during conventional toothbrushing.

Materials and Methods

This study was designed to measure plaque removal by manual tooth brushing for different brushing times. 40 subjects participated in the study. The subjects consisted of 30 females and 10 males aged between 18 and 65 with a minimum plaque score of 2. Subjects with atleast 20 gradable teeth and with good physical and oral health participated in the study. No subjects had a

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history of known sensitivity or oral mucosal tissue reaction to toothpaste. All subjects were medically fit and none were undergoing antibiotic or anti-inflammatory therapy or had undergone such therapy in the past 6 months. The study design consisted of a non randomised before after one group study. The plaque index used in this study group was the Turesky modification [4] of the original index of Quigley and Hein [5]. Subjects were given Colgate 360° whole mouth clean tooth brush and Colgate total tooth paste (1.5g) and were asked to brush for different times on a total of 5 occasions under supervision. Brushing times were assigned over a 3 week period and brushing times assigned were 30, 45, 60, 120 and 180 seconds. Subjects were advised in advance how long they were to brush and the brushing time was divided evenly between four quadrants. Brushing time was measured using a count-down timer. Dental plaque before and after brushing were evaluated and recorded. No prophylaxis was undertaken before the commencement of the study and no attempt was made to modify the volunteers [6] oral hygiene habits. Gibson et al., had shown that effective tooth cleaning is not achieved by detailed instructions at a single visit, including demonstration by the subject. Repetition of the instructions after 3 weeks also did not achieve a higher standard of plaque removal.

Statistical Analysis

Plaque was assessed on each individual tooth for all the subjects. The plaque index for various brushing duration were analysed and presented as mean, standard deviation and range. The statistical analysis used was Wilcoxon signed Rank Test to test the significant difference between pre and post brushing plaque index for

various durations. The difference between pre and post brushing at 30, 45, 60, 120 and 180 seconds were calculated and the significance was tested using Friedman test.

Results

Table 1 shows the change in Turesky index score from pre brushing to post brushing. A clear relationship between brushing time and plaque index was observed. The amount of plaque removed was highly dependent on the brushing time. This results show the importance and need for tooth brushing.

The longest duration of 180 seconds removed the the largest amount of plaque. The inter comparison between pre and post brushing plaque index between 30 and 180 seconds showed a p value of <0.0001.

Discussion

In this study Colgate 360° whole mouth clean tooth brush and Colgate total tooth paste were used. No effort was made to modify the brushing habits of the subjects. Tooth brushing was done under supervision for the stipulated time periods. The results of the study clearly shows that brushing time is an important determinant in plaque removal. A comparison between brushing time for 45 seconds, an estimate of the average brushing time employed by individuals [7] and 120 seconds being a consensus minimum brushing time recommended by oral health professionals [8] showed statistically significant difference (p value <0.0001) which is in accordance with studies conducted by Hawkins et al., [9].

Table 1.

	N	Minimum	Maximum	Mean	Std deviation	P value
Pre brushing	40	3.01	3.23	3.149	.04511	<0.0001
Post brushing 30 seconds	40	2.20	2.88	2.562	.13298	
Pre brushing	40	2.9	3.04	2.988	0.032	<0.0001
Post brushing 45 seconds	40	2.21	2.59	2.463	0.081	
Pre brushing	40	2.97	3.16	3.057	0.059	<0.0001
Post brushing 60 seconds	40	2.19	2.66	2.366	0.073	
Pre brushing	40	2.95	3.30	3.0595	0.076	<0.0001
Post brushing 120 seconds	40	2.12	2.4	2.2550	0.077	
Pre brushing	40	2.95	3.22	3.103	0.084	<0.0001
Post brushing 180 seconds	40	1.1	2.24	2.133	0.179	

Table 2. Difference between pre and post brushing plaque index.

	Mean	Std Deviation	Mean rank
30	.5870	.11947	1.86
45	.5249	.08468	1.36
60	.6908	.04393	2.86
120	.8045	.04788	3.95
180	.9702	.18406	4.98

The comparison between brushing times of 120 and 180 seconds showed significant reduction of plaque index (p value <0.0001). Klukowska et al., [10] showed no evidence of increased plaque removal beyond 1 minute, where as in this study plaque reduction was seen consistent with increased brushing duration except between 30 and 45 seconds. The use of dentifrice during tooth brushing is still controversial with many studies supporting the use [11] and some against the use [12] Future studies may be carried out to compare the effects of brushing for longer durations and split mouth techniques.

Conclusion

The results of this study emphasise the need for advising the patients about the duration of brushing time required for plaque removal, Results clearly shift towards an increase in plaque removal with increased brushing duration.

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