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Comparative Evaluation of Tooth Wipe and Manual Toothbrush on Reduction of Microbial Plaque

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Abstract

Background and aim. The toothbrush is the most widely used tooth-hygiene tool, and numerous designs have been manufactured, claiming superior plaque removal. This study aimed at comparing the efficacy of a tooth wipe to a manual toothbrush on reduction of microbial plaque.

Materials and methods. This crossover study was conducted on 30 subjects at two visits with one-week interval. Before each visit, individuals refrained from brushing teeth for 12 hours, had their regular meal, and then avoided to eat hard and/or soft foodstuff. Subjects were asked to brush their teeth with the allocated toothbrush (without toothpaste) using the Bass technique for 2 minutes at first visit and with the alternate toothbrush at the second visit. Pre- and post-brushing plaque was measured for total, proximal and buccolingual surfaces using the O'Leary Plaque Index. Paired t-test was used to analyze data.

Results. The overall plaque indices were significantly reduced with the tooth wipe and the manual brush (P = 0.000). There were no significant differences between tooth wipe and manual brush for removing plaque at total surfaces (46.01 ± 17.2% vs. 47.73 ± 17.04%, P = 0.75) and proximal surfaces (28.76 ± 23.15% vs. 43.71 ± 23.77%, P = 0.06). However, the plaque reduction at buccolingual surfaces by tooth wipe was significantly higher than that by manual brush (79.37 ± 23.54% vs. 56.83 ± 22.33%, P = 0.001).

Conclusion. The results indicate the tooth wipe is as effective as the manual toothbrush and can be used for marinating oral hygiene.

Key words: **Dental plaque, finger toothbrush, oral hygiene.**

Introduction

Dental plaque is considered as the main cause of tooth caries and periodontal disease. Plaque removal and preventing its establishment are important in controlling these conditions. Dental plaque control can be accomplished through three commonly used mechanical, chemical and antibacterial methods.[1] Mechanical plaque removal is the most effective technique to breakdown plaque and resolve gingival inflammation.[2] Maintaining gingival and periodontal health is mechanically carried out by taking away the plaque which is formed continuously. The plaque should be removed before development of gingival inflammation.[3]

Mechanical instruments currently used for plaque removal consist of various toothbrushes, dental floss, interdental brushes, and dental pick.[4] Mechanical control is generally obtained by toothbrush, offering the most common and effective at-home technique to control plaque.[5] Toothbrushes are present in two main types: manual and powered. For a majority of the population, a manual brush is the primitive and most sufficient mechanical care for plaque control.[6,7] There is another instrument for mechanical plaque removal called "finger type." Finger types maybe non-bristled (spongy or tooth wipe) or bristled. Tooth wipes are disposable, applied without toothpaste or water. Therefore, tooth wipes are suitable whenever water supply or other conditions for use of conventional toothbrushes are not accessible. In such conditions, due to easy usage and efficient plaque removal, tooth wipes are acceptable alternatives to manual toothbrushes.[8]

Although many studies have evaluated the efficacy of manual and powered toothbrushes, there is a limited number of reports on efficacy of tooth wipes in the literature. The aim of this study was to compare the efficacy of a newly-introduced tooth wipe with that of a manual toothbrush in reduction of microbial dental plaque.

Materials and Methods

This crossover examiner-blind study was conducted at two visits with one-week interval on 30 subjects, all selected from the dental students at Hamadan University of Medical Sciences in 2009. The study subjects were enrolled in the study if they had the following inclusion criteria: Absence of bridge or orthodontic appliances; no deep periodontal pockets (> 4 mm); and no use of antibiotics or imminosupressive medications during the past 3 months. All individuals were given a detailed description of the procedure and were required to sign an informed consent before participation. Non-surgical (phase 1) treatment, including scaling and prophylaxis (subjects matching), was performed for all subjects one month before beginning the study. Plaque reduction following a single brushing with a tooth wipe (CVS Tooth Wipe, CVS Pharmacy Inc, China) as test and using a manual toothbrush (Oral B-Advantage Plus, Oral B Co, Germany) as control was compared. Before each visit, individuals refrained from brushing teeth for 12 hours, had their regular meal, and then avoided to eat hard and/or soft foodstuff. Subjects were asked to brush their teeth with the allocated toothbrush (not use toothpaste) using Bass technique for 2 minutes at first visit and with the alternate toothbrush at second visit. Pre- and post-brushing plaque was measured for total, proximal and buccolingual surfaces using the O'Leary Plaque Index. A red disclosing agent was used to disclose plaque (PD, geneva, Switzerland). One calibrated examiner blinded to the allocated toothbrushes made all clinical measurements. Paired t-test was used to detect differences between finger tooth wipe and manual toothbrushs. Data were statistically analyzed using SPSS software.

Results

All subjects were male, with the mean age of 23.5 years old. The mean overall plaque indices before and after tooth-brushing are shown in Table 1. Both methods resulted in significant reduction of plaque on total, proximal and buccolingual surfaces ($P < 0.05$). As seen in Table 2, there were no significant differences between tooth wipe and manual brush for removing plaque at total surfaces and proximal surfaces. However, the plaque reduction at buccolingual surfaces by tooth wipes was significantly higher than that by manual brushes.

Table 1. Mean ± SD of plaque indices pre- and post-brushing with tooth wipe and manual toothbrush

Method	Pre-brushing	Post-brushing	Reduction
Tooth wipe			
Total surfaces	39.37±20.76	20.62±13.42	18.75±11.71
Proximal surfaces	45.75±24.52	32.26±20.04	13.49±13.16
Buccolingual surfaces	34.37±22.54	8.25±11.11	26.12±15.95
Manual toothbrush			
Total surfaces	35.82±16.82	19.70±11.15	16.12±9.21
Proximal surfaces	44.03±22.44	26.07±16.07	17.95±13.94
Buccolingual surfaces	28.03±17.29	13.56±11.75	14.46±10.24

Table 2. Relative plaque index reduction by using tooth wipe and manual toothbrush

Relative plaque index	Tooth wipe	Manual toothbrush	P. value*
Total surfaces	46.01±17.2	47.73±17.04	P= 0.75
Proximal surfaces	28.76±23.15	43.71±23.77	P= 0.06
Buccolingual surfaces	79.37±23.54	56.83±22.33	P= 0.001

* Paired t-test

Discussion

New toothbrushes are continuously being introduced. Dentists and consumers need to know how effective they are in removing dental plaque and maintaining oral health. Recently, many tooth wipes have been introduced to the market. However, there are few reports in literature regarding their efficiency in plaque removal.[9,10]

This study compared the efficacy of a tooth wipe in plaque removal with a manual toothbrush, as control. The tooth wipe significantly reduced plaque index on all dental surfaces, including proximal and buccolingual surfaces. In line with this finding, Goyal[9] found tooth wipes significantly removed plaque from facial and lingual surfaces. Galganny-Almeida[10] showed a significant decline in dental plaque using tooth wipes.

According to the American Dental Association (ADA), significant reduction of plaque could be clinically effective in maintaining oral health.[11] Imrey[12,13] suggested that plaque index reduction to less than 20 percent (threshold level) was necessary to control gingivitis. Our findings showed that efficiency of tooth wipe was comparable to the ADA advice, although it did not meet the 20% threshold recommended by Imrey.

Relative plaque reduction was used to compare the efficiency of tooth wipe with that of control. This is obtained from the difference of pre- and post-brushing indices divided by the pre-brushing index. This factor has been employed by some authors for comparative evaluation of toothbrushes.[10,14] Based on this factor, the difference between efficiency for removing plaque in total surfaces with CVS tooth wipe and Oral B-Advantage Plus was not significant, but the tooth wipe and the manual toothbrush showed different outcomes for to proximal surfaces compared to buccolingual surfaces. The tooth wipe tended to remove less plaque than the manual toothbrush. The higher outcome of the manual toothbrush in proximal surfaces could be associated to its bristle cleaning function in proximal surfaces. A study showed tooth cleaner instruments lacking bristles insufficiently removed plaque on interdental surfaces.[15] The efficiency of the tooth wipe in buccolingaul surfaces was higher than that of the toothbrush. This better outcome could be related to maneuver and pressure of the finger wearing tooth wipe. Goyal,[9] contrary to this finding, reported lower efficacy of tooth wipe compared to tooth brushes in removing plaque on total, facial and lingual surfaces. The discrepancies of these findings probably attribute to various designs and quality of the evaluated tooth wipes. Different methodology of studies is another factor that makes it difficult to compare their finding.

Goyal[9] suggested tooth wipes could be utilized whenever using conventional toothbrushes is not possible. Some authors have noted that foam-brushes which are comparable to tooth wipes should not be used as a permanent alternative to conventional toothbrushes.[1,19-21] However, Galganny-Almeida[10] have advocated tooth wipe as an appropriate technique for maintaining oral health in children.

Tooth wipes are disposable so they do not require washing or restoring, as is necessary with conventional toothbrushes. They don't carry the problem of bristle wear, present in old toothbrushes.[22] Although a probable risk with conventional toothbrushes, transition of microbial infections is almost impossible with tooth wipes.

Tooth wipes could be employed to deliver chemical and antibacterial agents, supporting routine oral health techniques. Saunders[23] found foam brush was an effective carrier to offer fluoride for the elderly. Because of their bristle-less design, tooth wipes produce no or little irritation, and their application could be useful for individuals with sensitive oral tissues. They are also an easy way of offering oral care in children and elderly, as well as individuals depending on others for dental and oral cleansing procedures.

Conclusion

The results of this study indicate that the tooth wipe is as effective as manual toothbrush on reduction of microbial plaque. It is recommended to use tooth wipe for maintaining oral hygiene whenever brushing with a manual toothbrush is not possible.

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