

ORIGINAL ARTICLE

The Effectiveness of Dry and Wet Teeth-brushing Technique Using 1.5% Enzyme Toothpaste as Plaque Prevention

R.P. Arief Rakhman¹, Heru Hananto¹, Theresia Indah Budhy², Ernie Maduratna S³

¹ Immunology Department, Universitas Airlangga, Jl. Dharmawangsa Dalam Selatan No.30, Airlangga, Surabaya, 60286 Indonesia

² Postgraduate School, Universitas Airlangga, Jl. Dharmawangsa Dalam Selatan No.30, Airlangga, Surabaya, 60286 Indonesia

³ Faculty of Dental Medicine, Universitas Airlangga, Universitas Airlangga, Jl. Mayjen. Prof. Dr. Moestopo 47, Surabaya 60132 Indonesia

ABSTRACT

Introduction: Dental plaque control is the only way to maintain oral hygiene. The purpose of this study was to determine the effectiveness of teeth-brushing with the dry compared to the wet-method using toothpaste-containing 1.5% vegetable-enzymes. **Methods:** The pre-post test study was done using randomly selected sampling. Samples were divided, Group-1: Teeth-brushing with dry-method, Group-2: Teeth-brushing with wet-method. Both participants were instructed to brush their teeth with the roll-method using a toothpaste-containing 1.5% enzymes, then the plaque was examined by the Patient-Hygiene-Performance-Index (PHP) from the dry and wet-brushing-teeth-method after 4 hours. The scoring of plaque was 0 = No-plaque; and 1 = plaque (debris). Data were analyzed by parametric statistical T-test. **Results:** There is a significant difference between dry and wet brushing-method as determined by paired t-test ($p = 0.001$). The dry teeth brushing-method scores recorded a PHP Index lower than the wet teeth brushing-method. **Conclusion:** Dry teeth brushing-method using a toothpaste that contains 1.5% enzymes is effective for the prevention of plaque.

Keywords: Enzyme-toothpaste, Dry-method, Brush-teeth

Corresponding Author:

R.P. Arief Rakhman,
Email: ariefrakhmandrg@yahoo.com
Tel: (+62) 31 5041566

INTRODUCTION

Dental plaque control is the only way to maintain oral hygiene (1), mechanical cleaning by brushing teeth (2) with a toothbrush and other complementary tools is the most effective method of plaque control and prevents calculus formation (1). One ingredient that can help the tooth brushing process is named toothpaste. One type of toothpaste in the market contains 1.5% vegetable enzyme and 0.24 sodium fluoride. The tooth brushing process recommended by the manufacturer that produces Enzyme® toothpaste is that before brushing, make sure the toothbrush is dry and it is not recommended to rinse it first. Whereas, generally people brush their teeth by using a wet method. Based on the above, the authors would like to research the effectiveness of dry and wet methods with toothpaste containing enzymes in an effort to prevent plaque

formation. Dental plaque is a specific deposit of bacteria (3), a soft granular deposit that collects on the surface of the tooth (4). Plaque formation begins 4 hours after the tooth is cleaned (5) which can be attached and growth of microorganism on the surface of the teeth, soft tissues, restorations, and appliances in the mouth to the tooth surface (3). The first stage in the formation of dental plaque in the form of pellicle formation and the second is the colonization of microorganisms attached to teeth above the pellicle (1,6).

Plaque control is an effort to remove microbial plaque and prevent the accumulation of plaque on the teeth surfaces, which play an important role in the healing process of gingival inflammation and periodontitis and prevent the emergence of dental caries, reduce the sensitivity of open root surfaces and prevent bad breath (halitosis) (1,7). Based on the movement of brushing, the method of brushing known in dental medicine is divided into 6 basic patterns, such as Vertical, Horizontal, Roll, Vibration, and another method proposed by Charters, Stillman, and Bass, which are Circular, and Physiological

methodS (7). The roll brushing technique is the most effective and often recommended method (2,8,9).

Toothpaste is a material that functions to cleanse and polish teeth (1) for prevention and therapeutic purposes (7) such as antibiotics, antiseptic, and enzymes (1,7,10). Enzymes can degrade microbial matrix cement, thus limiting the process of bacterial colonies. Enzyme's main activity is controlling bacterial proliferation by increasing the presence of hypothiocyanite at neutral pH or hypothiocyanous pH at low pH. Hypothiocyanite is believed to increase lytic action lysozyme (10).

MATERIALS AND METHODS

The study was an experimental research with the pre-post test study and samples were taken from 30 subjects who are students of the Faculty of Dental Medicine of Universitas Airlangga with randomly selected sampling that had undergone scaling treatment with plaque score index = 0, no periodontal abnormalities, good general condition, no systemic abnormalities, no denture or fixed orthodontic appliance, not being treated or taking drugs that affect to the gingival and its periodic tissue. Samples were divided, Group-1: Teeth-brushing with dry-method, Group-2: Teeth-brushing with wet-method. Both participants were instructed to brush their teeth with the roll-method using a toothpaste-containing 1.5% enzymes, then the plaque was examined by the Patient-Hygiene-Performance-Index (PHPI) (Fig. 1) from the dry and wet-brushing-teeth-method after 4 hours because of PHP index is more sensitive than OHI-s (1,7,11). The scoring of the plaque was 0 = No-plaque; and 1 = plaque (debris), then data were analyzed by parametric statistical T-test, see Figure 1.

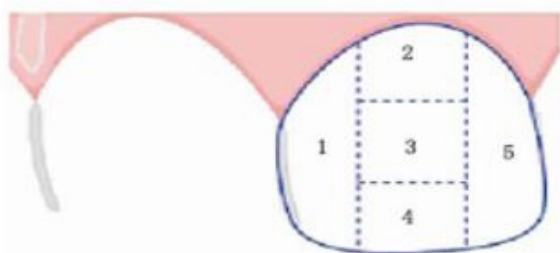


Figure 1 : 1. Mesial, 2. Cervical, 3. Middle part of tooth surface, 4. Incisal. 5. Distal

RESULTS

There is a significant difference between dry and wet brushing technique as determined by paired t-test ($p = 0.001$). The dry teeth brushing scores recorded a PHP Index lower than the wet teeth brushing technique (Table I).

Table I : Result Analysis of T-test of plaque after 4h wet and dry brushing teeth method

Types of Treatment	N	Mean Plaque Score	Deviation Standard	Assymp. Sig. (2-Tailed)
Brushing teeth with wet way	30	0.3134	0.14326	$p = 0,001$
Brushing teeth with dry way	30	0.1553	0.11245	$(p < 0,05)$

DISCUSSION

Based on the results of previous studies, the use of toothpaste containing 1.5% enzyme is effective in inhibiting the growth of dental plaque (10). When the use of 1.5% enzyme-containing toothpaste is given a different treatment in its use, that is brushing the teeth in a dry and wet-method, the data and analysis of research results show that the dry method can reduce plaque scores more than the wet-method as seen in 4 hours after being treated (5).

This is because the use of toothpaste containing 1.5% enzyme can increase H_2O_2 in saliva to reactivate the lactoperoxidase system contained in saliva (12). Lactoperoxidase shown various biochemical effects, such as anti-bacterial, inhibits the growth of various microorganisms, catalyzes the amino acid tyrosine in various proteins, catalyzes the formation of cross-links in several proteins including collagen (12). Stimulation of bactericidal systems is obtained by the addition of specific enzymes to overcome plaque formation by stimulating endogenous rejection systems with the help of enzymatic reactions (12).

The attachment of bacteria to the surface of the tissue contains hydrophobicity, thus, it must be any bacteria with the same degree of hydrophobicity that will bind to a similar hydrophobic structure, for example, the attachment of several species of the oral cavity of bacteria to the teeth (such as *Actinomyces viscosus*, *Actinomyces naeshindii*, *Streptococcus sanguis*, *Streptococcus mitis*, and *Phorproyomonas gingivalis*) (7). Hydrophobic conditions are separating agents, Li^+ cations, and SCN^- (tyrosinase) anions that are reducing the attachment of *Streptococcus sanguis* to saliva with hydroxyapatite layers, weakening sulfolane (thiophene, tetrahydro-1, dioxide) which has been shown to inhibit the attachment of *Streptococcus sanguis* in saliva with more than 50% hydroxyapatite layer (1,3).

In the same study, the greatest decrease in attachment could be seen by using a chaotropic agent, Sodium thiocyanate which decreases the attachment

of *Streptococcus sanguis* to the saliva with a hydroxyapatite layer of approximately 90%. Sodium thiocyanate has interacted with salivary bacterial adhesive receptors that can be dissolved with binding proteins in hydroxyapatite. This theory is based on the separation of proteins in thiocyanate (1,4). Local applications with 1.5% vegetable enzyme that is implemented twice daily for 6 weeks prevents the development of plaques that cause gingivitis (1,3).

CONCLUSION

The dry teeth-brushing technique using a toothpaste that contains 1.5% enzymes is effective for the prevention of plaque than the wet teeth brushing technique after 4 hours of treatment.

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