



**EFFECT OF VARIOUS HERBAL TOOTHPASTES IN REDUCING THE STREPTOCOCCUS MUTANTS COUNT**

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**ARTICLE INFO**

**Article History:**

Received 11<sup>th</sup> January, 2017

Received in revised form 19<sup>th</sup> February, 2017

Accepted 22<sup>nd</sup> March, 2017

Published online 28<sup>th</sup> April, 2017

**Key words:**

Herbal, toothpaste, antibacterial, streptococcus mutans, dental caries, agar well diffusion

**ABSTRACT**

**Aim & Objective:** To investigate the effect of various herbal toothpaste in reducing the count of streptococcus mutans.

**Background:** Streptococcus mutans is a facultatively anaerobic, gram-positive coccus commonly found in the human oral cavity and is a significant contributor to tooth decay. Early colonizers of the tooth surface are mainly Neisseria spp. and streptococci, including S. mutans. The growth and metabolism of these pioneer species changes local environmental conditions. Thereby enabling more fastidious organisms to further colonize after them, forming dental plaque. The combination of plaque and acid leads to dental decay. Practice of good oral hygiene including daily brushing, flossing and the use of appropriate mouthwash can significantly reduce the number of oral bacteria, including S. mutans and inhibit their proliferation. The objective of this study is to investigate the effect of various herbal toothpaste in reducing the count of streptococcus mutans by invitro method.

**Materials and method:** Five different commercially available herbal toothpastes were chosen as the samples. Culture was carried out using agar well diffusion method. Pure cultures of streptococcus mutans were obtained which was isolated using selective media Mutans - Sanguis agar. The zones of incubation were measured in mm diameter after the period of 24 hrs.

**Result:** Sample A with miswak extract has shown the highest zone of incubation measuring diameter of 39mm. Hence it is clear that, miswak extract in the toothpaste has a greater effect in reducing the mutants counts. It has the greater effect than the chlorexdine control.

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**INTRODUCTION**

Over 400 species of both aerobic and anaerobic bacteria colonise our oral cavity. Anaerobic bacteria outnumber their aerobic counterparts by a ratio of 10:1 to 100:1. These organisms inhabit the teeth, the gingival crevice, the mucous membranes, the dorsum of the tongue and saliva [1]. At birth the oral cavity is sterile but rapidly becomes colonized from the environment, particularly from the mother in the first feeding [2]. Dental caries is a disease, in which microbial fermentation of dietary carbohydrates forms lactic and other acids that leads to localized demineralization and destruction of the teeth. A cariogenic biofilm at a single tooth site may contain one-half-billion bacteria, of which species of mutansstreptococci are critical components. The characteristics contributing their cariogenicity are; ability to transport sugar, produces acid, tolerates acid's and produce

extracellular and intracellular polysaccharides[3]. Various measures proposed for the prevention of dental diseases include antibacterial measures, dietary measures, modification in plaque metabolism and increasing resistance to tooth attack[2]. Mechanical plaque control measures, such as toothbrushes, dental floss, toothpicks and interdental brushes used in conjunction with chemical plaque control aids, e.g. mouthrinses and medicated toothpastes are very popular in aiding oral hygiene [4]. But in most people, brushing alone is inadequate to remove the biofilm completely which may leads to the dental caries and periodontal diseases. Hence herbal toothpastes with antimicrobial activity can be used to maintain good oral hygiene. The main purpose of this study is to analyse the effects of various herbal toothpastes in reducing the streptococcus mutans count which colonise to form dental caries.

**MATERIALS AND METHODS**

Before starting this study, various brands of commercially available herbal toothpastes were obtained. Five toothpastes

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with different ingredients (Table.1) were chosen due to the constraints pertaining to available time and expenditure. Pure cultures of streptococcus mutants were obtained which was isolated using selective media Mutans - Sanguis agar [Hi media M977], and maintained in nutrient agar slope at 4°C in department of Microbiology, Saveetha Dental College.

**Table 1** Various ingredients of each toothpastes

Toothpaste number	Ingredients
1	Calcium carbonate, Sorbitol, water, silica, sodium lauryl sulfate, flavour, miswak extract, cellulose gum, carrageenan, sodium silicate, sodium saccharin, formaldehyde
2	Maricha(Piper nigrum), pipali(Pipet longum), Shunthi(Zingiber officinale), Tomar(Zanthoxylum armatum), Lavanga(Syzygium aromaticum), Karpura(Cinnamomum camphora), Pudina(Mentha species), gairic powder
3	Indian almond, common jujube, currant, Sarsaparilla, Cinnamon, Sappan wood, Persian walnut, Rose apple, Medlar, Barleria prinoitis, Prickly ash, Asian Holly Oak, Bedda Nur, Bengal Madder, Bishop's Weed, Catechu, Mayweed, Geranium, menthol, thymol, oils of clove, eucalyptus, peppermint
4	Dried ginger, black pepper, long pepper, harra, Amla, karpoor, clove, liquorice
5	Zanthoxylum alatum fruit extract, Acacia arabica stem bark extract, Terminalia chebula fruit extract, Terminalia Bellerica fruit extract, Emblica officinalis fruit extract, Embelia ribes fruit extract, Azadirachta indica bark extract, Vitex negundo extract, thymol, Punica Granatum pericarp extract, Acacia farnesiana stem extract etc.,

Culture was carried out using agar well diffusion method. Broth culture of the bacterial culture of the bacterial strain was adjusted to 0.5 McFarland turbidity standard. Lawn culture of the test organism was made on the Muller Hinton agar plates using sterile cotton swab and the plates were dried for 15 minutes. A sterile cotton swab was used to make wells measuring 6mm diameter and samples were introduced directly on the wells. The zones of incubation were measured in mm diameter after the period of 24 hrs. The results were analysed and noted.

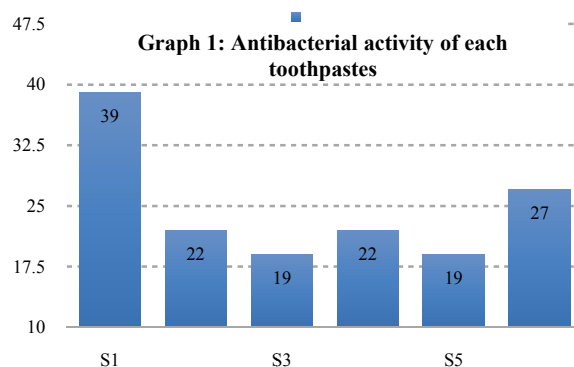
**RESULTS AND DISCUSSION**

Nowadays, most of the people use toothbrush and toothpastes for maintaining oral hygiene. So the mechanical and chemical form of oral hygiene aids help in preventing oral diseases like dental caries and periodontal diseases. Many of the toothpastes are well marketed with their highlighted benefits. Many of the products claims to have antimicrobial activity resulting in the dilemma of the consumers. Hence this research is carried out to evaluate the invitro antibacterial activity of commercially available herbal toothpastes.

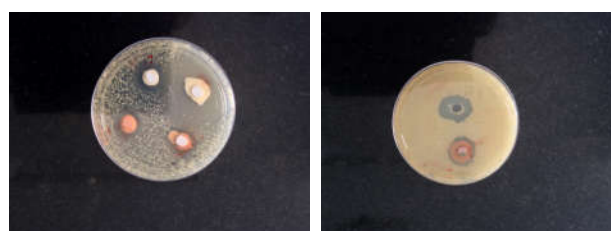
The antibacterial activity of the toothpastes was screened by using modified well diffusion technique and the zone of inhibition was measured in mm diameter. The results were analysed and tabulated (Table.2 and Graph.1).

**Table 2** Zone of inhibition formed by each toothpastes

	S1	S2	S3	S4	S5	Chlorexdine mouthwash
Zone of inhibition(mm)	39	22	19	22	19	27



From the results, it is clear that the toothpaste with miswak content (toothpaste.1) shows the highest zone of inhibition measuring 39mm diameter. It has the greater effect than the chlorexdine control which forms the zone of incubation of 27mm.



The least antibacterial activity was exhibited by the toothpaste.3 and toothpaste.5. This may be due to the ingredients present which may have least antibacterial activity against streptococcus mutants.

**CONCLUSION**

From this study, it is clear that folk medicine is can be effective as the modern medicine against pathogens. The use of herbal medicine is both economic and safe alternative to treat diseases. Normal toothpaste contains chemicals like fluoride, saccharin etc., Excess use of these contents could damage the tooth surface and causes the teeth to become mottled. Since herbal toothpastes are devoid of these contents and effective in reducing mutants count, use of these should be encouraged.

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**How to cite this article:**

Oviya.V.J and Geetha. R. V (2017) ' Effect of Various Herbal Toothpastes In Reducing the Streptococcus Mutants Count', *International Journal of Current Advanced Research*, 06(04), pp. 3072-3074.  
DOI: <http://dx.doi.org/10.24327/ijcar.2017.3074.0184>

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