

# Effect Of Herbal And Fluoride Toothpaste On Streptococcus Mutans - A Comparative Study

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## Abstract:

The aim of this study is to compare the effect of herbal based and fluoride based tooth pastes on Streptococcus mutans. The effect of the toothpastes are compared and hence an idea on how to prevent, control and treat the dental caries is formulated. Streptococcus mutans is a bacterium commonly found in the human oral cavity and is a significant contributor to tooth decay. The bacterial count is one of the main reasons for the initiation of dental caries. Sucrose is used by Streptococcus mutans to produce a sticky, extracellular, dextran-based polysaccharide that allows them to cohere, forming plaque. An herbal based toothpaste and a fluoride based toothpaste will be used for the study. The effect of these two toothpastes on Streptococcus mutans will be studied by agar well diffusion technique. The findings are compared between the groups. The results suggested that Fluoridated toothpaste had maximum antimicrobial activity at all concentrations when compared to Herbal toothpaste. The higher antimicrobial activity of fluoride containing toothpaste could be attributed to the presence of different components like triclosan and fluoride.

**Key Words:** Herbal, Fluoride, Anti bacterial, Dental caries, Agar well diffusion

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## INTRODUCTION:

The spread of drug resistant pathogens is one of the most serious threats to successful treatment of microbial diseases. Now with the introduction of various toothpastes that contain fluoride, a question arises as to which is the better toothpaste. The herbal toothpastes have the basic ingredients such as Calcium Carbonate, Glycerine, Water, Sodium Lauryl Sulphate, Extracts of Ginger, Camphor, Menthol & Clove oil, Sodium Carboxymethyl Cellulose, Silica, Sodium Benzoate & Sodium Saccharine, Sorbitol. The main ingredients in the fluoride toothpaste are Sodium monofluorophosphate, triclosan and fluoride.<sup>[1]</sup> Both chemical and mechanical oral hygiene aids are used for removal and prevention of plaque. Mechanical plaque control measures, such as toothbrushes, dental floss, toothpicks and interdental brushes are very popular and are mostly used in conjunction with chemical plaque control aids, e.g. mouthrinses and medicated toothpastes<sup>[2]</sup>. Yet, in most people, brushing alone is inadequate to remove oral biofilm to an extent that the development of periodontal diseases and caries is prevented<sup>[3]</sup>. Thus, antimicrobial toothpastes that augment mechanical plaque removal may provide an effective means to maintain good oral hygiene. Despite the efficacy of many toothpaste formulations with antibacterial properties,<sup>[4,5]</sup> there is an increasing societal desire to rely on naturally occurring compounds for health care, which has also found its way into dentistry<sup>[6]</sup>. The other alternative toothpaste on the market for use by infants, do not contain fluoride in their composition, but have herbal products or enzymes to produce antiseptic or antimicrobial effects

## MATERIALS AND METHOD:

against cariogenic and opportunistic micro-organisms in the oral environment<sup>[7]</sup>. Furthermore, few research efforts are directed toward addressing the potency or quality of herbal ingredients used in these dental products. While many

herbal toothpastes claim to have antimicrobial properties, very little research was conducted to investigate these claims.<sup>[8]</sup> Hence this study is done to compare the antibacterial effect of the herbal toothpaste and the fluoride toothpaste on Streptococcus mutans.

## Test microorganisms

Bacterial strain used was Streptococcus mutans. The organism 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.

## Toothpaste

Three toothpastes namely fluoride containing A, a herbal B and a herbal C were selected for this study. The products were collected from local market, Chennai.

## Methodology

The antimicrobial activity of different concentrations of the dentifrices was determined by modified agar well diffusion method. Lawn culture of the test organisms were made on the Muller Hinton agar [MHA-Hi media M1084] plates using sterile cotton swab and the plates were dried for 15 minutes. Dentifrice dilutions at different concentrations were introduced into each of the three wells. The plates were incubated at 37°C for 24 h. The antimicrobial activity was evaluated by measuring the diameter of zones of inhibition (mm).

## RESULT:

The antibacterial activity of the toothpastes at different concentrations was screened by modified well diffusion technique and the zone of inhibition was measured in mm diameter. The results are given in the table 1. The fluoride toothpaste A was more effective against Streptococcus mutans with a zone of inhibition of 29mm diameter, herbal toothpaste B showed a zone of 26mm diameter and with the herbal toothpaste C the zone diameter was 23mm.

Organism	Fluoride toothpaste A	Herbal toothpaste B	Herbal toothpaste C	Control Chlorhexidine gel
Streptococcus mutans	29mm (diameter)	26mm (diameter)	23mm (diameter)	23mm (diameter)

**Table 1** Anti bacterial activity of the three types of toothpastes

#### DISCUSSION:

Dental caries is a microbial disease that result in the destruction of mineralized tissue of the teeth. Streptococcus mutans is the potent initiator and leading cause of dental caries world wide. It is considered to be the most cariogenic of all of the oral Streptococci. The present study was to evaluate the antibacterial activity of both the Herbal toothpastes and the Fluoride toothpastes. Fluoride containing toothpaste due to the triclosan/copolymer along with the 1000ppm Fluoride provides a more effective level on plaque control and periodontal health than conventional fluoride toothpaste<sup>[9]</sup>. It has been suggested that triclosan blocks lipid biosynthesis by specifically inhibiting the enzyme enoyl-acyl carrier protein reductase (ENR). This feature of fluoride toothpaste can be attributed to the antimicrobial efficiency. The fluoride tooth paste reduces the number of streptococcal colony forming units of dental plaque despite the fact that fluoride was added to the toothpastes first with aiming to preserve the product and then to protect the teeth<sup>[10]</sup>. The effectiveness of fluoride toothpastes as an antimicrobial agent is concentration dependent. Using natural medicines to cure various diseases has become an increasing trend. Herbal medicine has made significant contribution to modern medical practice<sup>[11]</sup>. The antimicrobial activity of the herbs is due to the presence of secondary metabolites such as alkaloids, flavonoids, polyphenols, and lectins<sup>[12]</sup>. Synergistic interactions between the principal components of these herbs are considered to be a vital part of their efficacy. The results obtained from our study shows that the Fluoride toothpaste has got a very good antibacterial activity against Streptococcus mutans.

#### CONCLUSION:

The level of pathogenic organisms in the oral microbiota is one of the etiological factors for dental caries and other periodontal diseases. There are a number of toothpastes available in the market that claim to have antimicrobial potential. This study has proved that the fluoridated

toothpaste remains a gold standard as far as antimicrobial efficacy is concerned. However, it must be recognized that 1000 ppm fluoride containing toothpastes are not recommended for children. Herbal tooth paste also showed antimicrobial properties and is a herbal product; thus reducing the chances of fluoride toxicity.

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