

# **Biological Assessment of Three Experimental Toothpaste Additives**

## **Thesis**

Submitted to the Faculty of Dentistry,  
Ain Shams University  
For the partial fulfillment of the requirements of  
The Doctor Degree in Operative Dentistry

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2015

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## ACKNOWLEDGEMENT

I would like to express my deep appreciation to ***Dr. Khaled Aly Nour***, Assistant Professor in Department of Operative Dentistry, Faculty of Dentistry, Ain Shams University, for his valuable ideas, stimulating advices, constant encouragement and keen supervision throughout the research program.

My deepest appreciation and sincere gratitude go to ***Prof. Dr. Mohamed Hussein Zaazou***, Researcher Professor of Restorative dentistry and dental material research Department, National Research Center, for his unforgettable help, advice, guidance and co-operation.

Words are not enough to express how deeply I am grateful to all the help that ***Prof. Dr. Nyra Shaker Mehanna***, Researcher Professor in Department of Dairy Science, Food Science and Nutrition, National Research Center, has offered and for scarifying much of her time for this work to be done.

My thanks are extended to ***Dr. Shaimaa Mohamed Nagi***, Researcher in Department of Operative Dentistry, Restorative and Dental Material, National Research Center, for her kind cooperation and many helpful suggestions for improvement, which have been of great value.

I am deeply grateful to ***Dr. Ahmed Alaa Kassem***, Researcher in Department of Pharmaceutical Technology, National Research Centre, for his great help in providing the required material for this study.

## ***Dedication***

*First and foremost I thank God who paved the way and only by his will everything can be achieved.*

*To my father and my mother for their unlimited Love, Giving and whose support & encouragement have always been my inspiration.*

*To my husband and my kids for their love and patience.*

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

" قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ  
الْحَكِيمُ "

صدق الله العظيم

سورة البقرة الآية ( ٣٢ )

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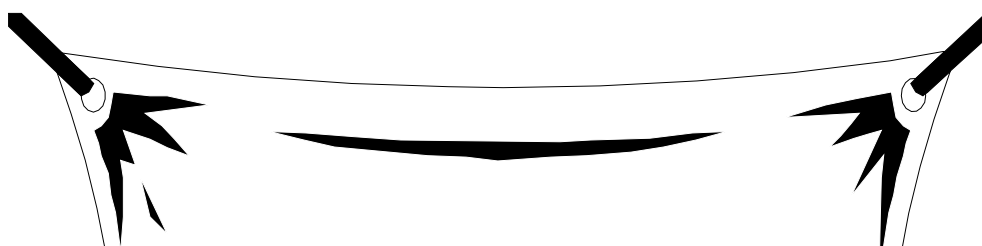
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## INTRODUCTION

Dental caries is one of the most common infectious diseases affecting humans. *Streptococcus mutans* (*S. mutans*) has been consistently linked with the formation of human dental caries and is the most commonly implicated initiator and plaque-resident bacterium. *S. mutans* begins demineralization and the metabolism of simple carbohydrates; this produces acid as a by-product, which leads to tissue loss and further bacterial penetration <sup>(43,122)</sup>.

For centuries, people in the Middle East and adjoining areas of Africa had used chewing sticks, called Miswak, to maintain oral hygiene <sup>(17)</sup>. The roots and branches of the Arak (*Salvadora persica*) tree are the most common sources of Miswak <sup>(33)</sup>. Several studies reported the antibacterial activity of chewing stick of Miswak and its extracts against cariogenic bacteria <sup>(2,14)</sup>.

In recent times, the concept of restoring and maintaining oral health by use of beneficial bacteria (probiotics), such as *Streptococcus salivarius* expressing bacteriocins against oral pathogens, has been asserted <sup>(26)</sup>. *Lactobacillus rhamnosus* (*L. rhamnosus*) is also known to inhibit the growth of cariogenic streptococci by producing anti-streptococcal substance and the inability of *L. rhamnosus* to ferment sucrose or lactose greatly increases its potential as a good probiotic against cariogenic streptococci <sup>(133)</sup>.

Moreover the use of natural agents (like propolis) against selected oral pathogens had been reported. Propolis which is a natural resinous, sticky, dark-colored product from honeybees has been used for hundreds of years in folk medicine for several purposes. The ethanol extract of propolis possesses several biological activities such as anti-inflammatory, antifungal, antiviral, antimicrobial activity and the inhibitory action against the growth of *S. mutans* and its production of glucosyltransferase, the enzyme responsible for the formation of dental plaque and caries <sup>(25,40)</sup>.