بسم الله الرحمن الرحيم

" قالوا سبحانك لا علم لنا إلا ما علمتنا إنك أنت العليم الحكيم"

صدق الله العظيم

سورة البقرة الآية ٣٢

المشـرفـون

أ.د. / هبة صلاح الدين حمـزة

أستاذ العلاج التحفظى للأسنـان

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التأثير السريرى لمنتجين ذى مكونات طبيعية على تثبيط التسوس

رسالة مقدمة من

الطبيبة / هدى رأفت محمد رياض

بكالوريوس طب الفم والأسنان

٢٠٠٢

كلية طب الفم والأسنان

جامعة القاهرة

٢٠٠٩

In Vivo Effect of Two Products With Natural Ingredients on Caries Inhibition

Thesis

Submitted to The Faculty of Oral and Dental Medicine, Cairo University in Partial Fulfillment of Requirements

for the Master Degree

In

Operative Dentistry

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B.D.S, 2002

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2009

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Abstract

Objective: The objective of the current study was to evaluate the effect of propolis and licorice; as products with natural ingredients, on the salivary *S. mutans* counts and the buffering capacity in high caries risk patients of age ranging between 18 and 30 years old in a three months duration study.

Materials and Methods: The study comprised 30 high caries risk subjects, their caries risk was assessed considering DMFT scores and salivary *S. mutans* counts. Stimulated whole saliva samples were collected. Diluted saliva samples were cultured on Mitis Salivarius Bacitracin agar plates, and the buffering capacity was measured. The subjects were randomly divided into three groups: control group which performed only mechanical tooth brushing, propolis group which performed tooth brushing in addition to the use of propolis containing mouthrinse, and licorice group which performed tooth brushing in addition to the use of DGL chewable licorice tablets. Saliva samples were taken at three intervals; at the baseline of the study, after one month and after three months.

Results: During the whole period of the study, the propolis group showed statistically significant decrease in the mean values for the change in log salivary *S. mutans* counts at $p \leq 0.001$, the licorice group showed statistically significant decrease in the mean values for the change in log salivary *S. mutans* counts at $p \leq 0.05$, while no statistically significant difference was found for the control group at $p > 0.05$. Also propolis group exhibited statistically significant increase in the salivary buffering capacity, licorice group exhibited slight increase, while the control group did not.

Conclusion: it was concluded that propolis and licorice have antibacterial effect against *S. mutans* and propolis can increase the buffering capacity of the saliva, and so propolis containing mouthrinse could be effective in inhibiting dental caries.

Keywords: *S. mutans*, Buffering capacity, Propolis, Licorice

List of Abbreviations

DMFT	Decayed missing filled teeth
DMFS	Decayed missing filled surface
DGL	Deglycyrrhizinated licorice
CFU	Colony forming units
TYCSB	Tryptic Soy Broth
MSB	Mitis Salivarius Bacitracin
MS	Mutans streptococci
LB	Lactobacilli
CLT	Conventional laboratory test
CRT	Caries risk test
ICDAS	Internantional Caries Detection & Assessment System
EEP	Ethanolic extract of propolis
WIG	Water insoluble glucan
RPHPLC	Reversed phase high performance liquid chromatography
MIC	Minimum inhibitory concentration
MBC	Minimum bactercidial concentration
GTF	Glucosyltransferase
BHIB	Brain heart infusion broth
MHB	Mueller Hinton Broth
BGP	Brazilian green propolis
EEH	Ethanolic extract of hexane fraction
WSEP	Water soluble extract of propolis
FT-IR	Fourier transform infrared spectroscopy
SAS	Statistical analysis system
q.s.	Quantum satis

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Dedication

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

To my parents whose support & encouragement have always been my inspiration.

Acknowledgment

I would like to express my sincere gratitude to ***Prof. Dr. Heba Salah El Din Hamza***, Professor of Operative Dentistry, Faculty of Oral & Dental Medicine, Cairo University, for her generous effort, continuous encouragement, valuable guidance, constructive suggestions and real support throughout this study.

I am also deeply indebted to ***Dr. Dalia Mostafa Aboul Magd***, Assistant Professor of Operative Dentistry, Faculty of Oral & Dental Medicine, Cairo University, for her effective cooperation, great help, valuable orientation and for scarifying much of her time for this work to be done.

I would like to express my heartful thanks & appreciation to ***Dr. Wael Attia Tawfeek***, Associate Researcher Professor, Dental Department, National Research Centre, for the immense support & his infinite encouragement, making it possible to carry this work forward.

Words are not enough to express how deeply I am grateful to all the help that ***Dr. Nadia M. Madani***, Lecturer of Microbiology & Immunology, Faculty of Medicine, Cairo University, have offered. I owe her a sincere appreciation, due thanks and gratitude.

I am deeply grateful to ***Dr. Dina Mahmoud***, Associate Researcher Professor, Pharmacological Technology Department, National Research Centre, for her great help in providing the required material for this study.

I am gratefully acknowledging ***Dr. Mohamed Zazou***, Associate Researcher Professor, Dental Department, National Research Centre, for his many helpful suggestions for improvement, which have been of great value.

My thanks are extended to ***Dr. Wael Hossam Eldin,*** Researcher assistant, Infrared Lab, National Research Centre, for his kind cooperation.

Finally, I would like to thank all my friends & colleagues who kindly accepted to participate in this study.

Introduction

Dental caries is an ancient disease that has affected the human race through its history. It is still considered one of the most prevalent infectious diseases in the world. Although the nature of the disease and the methods of treatment have advanced tremendously during the past century, the disease is still not controlled worldwide. An improvement in oral health in developed countries has been achieved with reduction in caries incidence. The use of a variety of oral hygiene products and the addition of fluoride to potable water may be contributing factors.

On the other hand, dental caries incidence is on the rise in the developing countries due to the lack of adequate community-oriented prevention or treatment programs.

To treat caries with the traditional western model based on recall, diagnosis and restoration, is beyond the financial capabilities of the majority of low-income nations. Therefore finding an economic, safe and effective alternative model for the prevention and treatment of dental caries is a necessity, especially in developing countries **(Badria and Zidan, 2004)**.

Formation of dental caries is caused by the colonization and accumulation of oral microorganisms and extracellular polysaccharides that are synthesized from sucrose by glucosyltransferase of *Streptococcus mutans*.

The combination of several tests is essential to obtain a final diagnosis of caries risk mainly considering the multifactorial etiology of dental caries **(Van Houte, 1993)**, but it is impracticable to measure all the risk factors so evaluation of *Streptococcus mutans* counts and of the

buffering capacity of saliva appears to be the most predictive diagnostic approach **(Wilson and Ashley, 1989).**

Propolis; a resinous hive product, has been used for thousands of years in folk medicine for several purposes. It possesses several biological activities. Chemically, propolis is exceedingly complex and contains a rich variety of potent benzoic, caffeic and phenolic acids and also it is high in flavonoids which themselves may account for many of the benefits attributed to propolis. Although the antibacterial activity of propolis has been already demonstrated, very few studies have been done on bacteria of clinical relevance in dentistry.

Licorice or *Glycyrrhiza glabra* is an herb, the root of which has been used for over thousands of years to treat wide range of complaints making it one of the most widely used medicinal herb in history. Liquorice compounds such as have potential antimicrobial properties that imply a possible benefit for promoting oral health.

Accordingly, in the present study the effect of propolis and licorice; in the form of products with natural ingredients, on *Streptococcus mutans* counts and buffering capacity of saliva had been investigated. Meanwhile modifying the caries risk in a group of high risk patients was attempted.