بسم الله الرحمن الرحيم

"قالوا سبحانك لا علم لنا إلا ما علمتنا

إنك أنت العليم الحكيم"

صدق الله العظيم

صورة البقرة الآية 32

Morphological and chemical analysis of acid Demineralized and remineralized enamel

Thesis

Submitted to the Faculty of Oral and Dental Medicine, Cairo University in Partial Fulfillment of Requirements of the Master Degree

In

Operative Dentistry

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B.D.S., 1998

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2009

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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 ***Dr. Dalia Mostafa Aboul Magd,*** 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 her for her effective cooperation, great help, valuable orientation and for sacrificing much of her time for this work to be done. I would like to express my heartful thanks & appreciation.

I would like to express my sincere gratitude to ***Dr. Inas El Ghandour,*** Associate 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.

List of Tables

List of Figures

List of Contents

Abstract

Objective:

The objective of the current study was to evaluate the effect of two acids (citric acid and hydrochloric acid) on the morphology, chemical structure and remineralization capacity of the enamel surface done by two remineralizing agents (fluoride containing and casein phosphopeptide containing).

Materials and Methods:

Twenty non-carious cleaned scaled human molar teeth were selected for this study then stored in distilled water in room temperature until used. These teeth were then divided into two main groups, each composed of ten teeth. Every tooth of each group was sectioned into four quarters, one quarter acted as a control and the other three quarters were immersed into one of the used demineralizing acids of standardized pH and concentration for a specific time to produce the erosive lesions. Then, two quarters of the three quarters were subjected to the remineralizing agents. Assessment of erosive lesions and subsequent remineralization were done using morphological and chemical analysis.

Results:

Erosive alterations of enamel of teeth by citric acid and hydrochloric acid statistically significantly decreased calcium and phosphorus content while it statistically significantly increased the surface roughness of enamel of teeth.

Remineralization of enamel of teeth by fluoride and casein phosphopeptide statistically significantly increased calcium and phosphorus content while it statistically significantly decreased the surface roughness of enamel of teeth.

Conclusions:

1. Fluoride and casein phosphopeptide containing remineralizing agents had a remarkable effect on the remineralization of enamel after being demineralized by citric acid and hydrochloric acid demineralizing agents.

2- Casein phosphopeptide decreased surface roughness to reach the same value of the control group.

3- Ca/P ratio was stable in hypomineralized, remineralized and sound enamel.

Keywords: erosion – citric acid – hydrochloric acid- remineralization – fluoride – casein phosphopeptide - enamel

Introduction

Dental erosion is the process whereby tooth enamel is destroyed by the action of acid on the teeth without bacterial involvement and the patient reports symptoms of hypersensitivity. The acids responsible for erosion are not products of the intraoral flora, they stem from dietary occupational or intrinsic sources. (Woodbury 2004).

Citric acid is a main source of erosion of enamel of teeth; it exists in greater than trace amounts in a variety of fruits and vegetables, most notably citrus fruits. Lemons and limes have particularly high concentrations of the acid.

Hydrochloric acid is found in gastric acid which gets exposed to enamel of teeth during regular vomiting and leads to erosion of enamel of teeth. It is also found in chlorinated water of swimming pools and in factories in many industries like pickling of steel and composition of some organic and inorganic compounds.

Remineralization of teeth is suggested as a solution to dental erosion. The main advantage of remineralization is the conservation of the tooth structure, avoiding the drill and fill concept. (Al-Khateeb et al; 2000)

Fluoride is found to be the key agent in battling carries, works primarily via topical mechanisms: inhibition of demineralization, enhancement of remineralization and inhibition of bacterial enzymes. (Johan D. B. Featherstone, 2000).

The effect of fluoride on the progression of dental erosion has not been investigated as thoroughly as the action of fluoride involved in the remineralization of early carious lesions. It has been speculated that

fluoride uptake from fluoride containing fruit drinks is more substantial than from fluoridated water because of the action of fruit acids and citrate on the enamel surface, as etching of enamel increases the surface reactive area and topically applied fluoride has been shown to accumulate in demineralized lesions. (Peariasamy et al, 2001).

A new casein phosphopeptide containing remineralizing agent is introduced to preventive dentistry that prevents demineralization and enhances remineralization. (Laurence, 2000)

Casein phosphopeptide is derived from casein found in cow's milk, it binds calcium and phosphate and keeps them in a soluble form (amorphous). It was found to be very sticky and so it binds easily to enamel. It also can transform the visual opacity of new white spots to a more natural 'tooth-like' translucency.

Therefore, the aim of the study is to evaluate the effect of two acids on the morphology and structure of enamel together with the evaluation two remineralizing agents on induced enamel erosive lesions.