A Study on the Correlation of Salivary Streptococcus Mutans count in Mothers and their Children in Two Groups of Mothers with High and Low Caries Experience

Thesis

Submitted to the Faculty of Oral and Dental Medicine
Cairo University
In partial fulfillment of the requirements
of master degree in Pedodontics and Orthodontics

By

Randa Youssef Abd El Gawad
B.D.S (Cairo University 1998)
Demonstrator in Pedodontic and Dental Public Health Department

Faculty of Oral and Dental Medicine
Cairo University

2005

Supervisors

Prof. Dr. Sherine Ezz El Din Taha

Professor of Pedodontics and Dental Public Health

Faculty of Oral and Dental Medicine

Cairo University

Dr. Hala Mohy El Din Abbas

Lecturer of Dental Pubic Health

Faculty of Oral and Dental Medicine

Cairo University

Dr. Zeinab Abd El Khlalek Ibrahim

Lecturer of Microbiology and Immunology

Faculty of Medicine

Cairo University

Acknowledgment

I would like to express my deep appreciation and sincere gratitude to ***Prof. Dr. Sherine Ezz El Din Taha,*** Prof. of Pedodontics and Dental Public Health, Faculty of Oral and Dental Medicine, Cairo University, for her kind suggestion of the subject, constructive effort, continuous support, motivation and for the time she generously gave for guiding me throughout this study.

I would like to thank ***Dr. Hala Mohy El Din Abbas,*** Lecturer of Dental Public Health, Faculty of Oral and Dental Medicine, Cairo University, for her tremendous effort and sincere advice throughout the research.

My appreciation are extended to ***Dr. Zeinab Abd El Khalek Ibrahim,*** Lecturer of Microbiology and Immunology, Faculty of Medicine, Cairo University, for her constructive guidance through out the practical work of the present thesis.

Finally I would like to thank all the staff members of Pedodontic Department, Faculty of Oral and Dental Medicine, Cairo University for their continuous help and constant support.

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Introduction

Dental caries is the most prevalent chronic disease affecting the human race. It affects both sexes, both deciduous and permanent teeth in all ages, in all races and all socioeconomic strata. Once caries occurs its manifestations persist throughout life even though the lesion is treated.

Dental caries is a multifactorial process; three main factors must occur simultaneously for dental caries to develop, susceptible tooth and host, cariogenic tooth-associated microorganisms and cariogenic diet for a certain period of time.

Streptococcus mutans are considered the prime bacteriological agent involved in the initiation and progression of dental caries. Because the presence of teeth or other non-desquamating surfaces is a perquisite for stable colonization of *Streptococcus mutans*, infants acquire *Streptococcus mutans* after their teeth emerge ***(Hanada, 2000 and Tanzer et al., 2001).***

Transmission of *Streptococcus mutans* follows familial lines, where children acquire *Streptococcus mutans* from their mothers; this vertical transmission is reasonable , since mothers usually enjoy frequent and intimate contact with their infants in the first two years of life when *Streptococcus mutans* are initially transmitted ***(Caufield et al., 1993 and Lindquist and Emilson, 2004).***

The level of *Streptococcus mutans* in saliva of a mother correlate significantly with its level in her child. This correlation suggests that a quantitative relationship exists between levels of salivary *Streptococcus mutans* in mothers and their children ***(Caufield et al., 1988 and Thorlid et al., 2002)***

Numerous studies have shown a high association between the number of carious lesions in preschool children and the level of *Streptococcus mutans* in saliva or dental plaque. Consequently, determination of the level of salivary *Streptococcus mutans* has been successfully used for the assessment of caries risk in preschool children ***(Powell, 1998, Thibodeau and O' Sullivan, 1999 and Seki et al., 2003).***

This study is designed to throw light on the correlation of salivary *Streptococcus mutans* counts and dental caries experience of mothers and their children in two groups of mothers with high and low caries experience; and to clarify the prediction of caries risk in preschool children from salivary *Streptococcus mutans* counts of their mothers'.

Aim of the Study

The Aim of this Study is:

To correlate salivary *Streptococcus mutans* counts and dental caries experience of mothers and their children in two groups of mothers with high and low caries experience.

Review of Literature

Dental Caries

Dental caries is one of the most infectious diseases seen in all populations. It can be defined as a bacterial disease of calcified tissues of the teeth characterized by demineralization of the inorganic and destruction of the organic substrate of the tooth ***(Soames and Southam, 1993).***

It is a complex and dynamic process involving, for example, physicochemical processes associated with the movements of ions across the interface between the tooth and the external environment, as well as biological processes associated with the interaction of bacteria in dental plaque with host defense mechanisms ***(Kingman and Selwitz, 1997 and Guglielmo et al., 2000).***

Although the prevalence of dental caries in many developed countries has markedly declined in recent years, this decline has not been evenly distributed within populations. In most developing countries the prevalence of caries has been claimed to be increasing rapidly over the last two decades ***(Fedration Dentaire Internationale , 1994 and Al Ghanim et al., 1998).***

The prevalence of dental caries in children living in the Middle East is less well documented than those in more developed countries. Sufficient data have not been produced by studies of small groups in various Arab countries to indicate that the overall problem is currently similar to that of European children. However, in the Middle East countries the caries rate appears to be increasing ***(Al Shammery et al., 1990, Al Mughery et al., 1991, Magbool, 1992, Janson and Fakhouri , 1995 and Wyne et al., 1996).***

Etiology of Dental Caries :

Various theories for the development of dental caries have been proposed, however three general theories regarding the mechanism of dental caries have been postulated, the *Chemico-Parasitic (Acidogenic) theory* proposed by ***Miller, 1890***, the *Proteolytic theory* proposed by ***Gottlieb, 1944*** and the *Proteolysis-Chelation theory* by ***Shafer, 1983***.

1. The most accepted theory is *The Acidogenic theory* or *Miller's Chemico-Parasitic theory*. This theory states that dental caries is a chemico-parasitic process consisting of two stages, decalcification of enamel and dentin followed by dissolution of the softened residue. The acids which initiate the primary decalcification are derived from the action of microorganisms on sugars and starches lodged in the retentive sites of the teeth ***(Miller, 1890).***

2. *The Proteolytic theory:*

This theory postulates that the organic structures of the tooth provide the initial pathway for invasion of microorganisms and their products, and this is preceded by the loss of the inorganic phase. The proteolytic bacteria act on the organic matrix of enamel liberating sulfuric acid from sulfated mucopolysaccharides of the organic matrix, this acid dissolves enamel minerals ***(Gottlieb, 1944)***.

3. Proteolysis-Chelation theory:

A ***chelator*** is a molecule which can bind a metal ion in a ***claw-like*** configuration to form a ring structure. The *Proteolysis-Chelation theory* postulates that proteolytic bacteria act on the organic matrix of enamel liberating chelating agents as amino acids, citrate and peptides. These chelating agents demineralize enamel by binding and transporting calcium ions out of enamel at neutral or even alkaline pH ***(Shafer, 1983).***

Factors affecting the development of Dental Caries:

The primary essential factors contributing to the initiation and progression of dental caries are the susceptible tooth, the causative micro-organism and the local substrate (fermentable carbohydrates) that should be adherent to the tooth surfaces with the presence of causative micro-organism ***(WHO, 1994).***

The susceptibility of the tooth to decay may be partly a matter of hereditary factors. These factors may be the tooth chemical composition and its anatomical characteristics, such as high cusps and deep pits and fissures which favor impaction, initiation and progression of dental caries ***(Bossert, 1993 and Tinanoff, 1995 a).***

The interaction among the risk factors, such as cariogenic bacteria, saliva, fermentable carbohydrates and fluoride in the oral environment, influence bacterial colonization as well as either the demineralization or the remineralization of teeth ***(Fejerskov and Manji, 1990).***

Teeth are highly susceptible to dental caries in the first few years after eruption. This period of increased caries susceptibility has often been explained as poor maturation of enamel surface. However, differences in susceptibility to caries between individuals are large ***(Zickert et al., 1987 and Köhler et al., 1988).***

The role of dental plaque in caries has been clearly established. Dental plaque is composed primarily of microorganisms; one gram of plaque contains approximately $2x10^{11}$ bacteria. The microorganisms exist within an intercellular matrix that also contains few host cells such as epithelial cells, macrophages and leukocytes ***(Haake et al., 2002).***

The intercellular matrix, estimated to account for 20% to 30% of the plaque mass. It consists of organic and inorganic materials derived from