Antibacterial efficacy of a mouthwash containing hydroxyapatite nanoparticles in combination with chlorhexidine/fluoride

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Dedication

To my precious parents,

For their subjective love, valuable blessings and prayers.

To my scarifying husband,

For his endless support and patience.

To my lovely daughter karma,

For her inspiration.

I dedicate this work

Introduction

Clinical decision-making and the balance between preventive and surgical intervention have become an important part of daily dental practice (**Autio-Gold et al., 2008**). Some dental schools and private practitioners have implemented specific medical models for caries management and published their protocols (**Doméjean-Orliaguet et al., 2006 and Guzman-Armstrong and Warren 2007**).

In the era of these medical models of caries treatment renewed interest in developing an antimicrobial approach for the management of dental caries. In conjunction with this concept, control and prevention of caries has been sought by reducing the number of colonizing bacteria. Reducing their level in the oral cavity will provide an additional rationale for the prevention of dental caries (**Pallavi et al., 2011**).

Chlorhexidine (CHX) has been known as an excellent broad spectrum antibacterial compound **(Denton et al., 1991)**. Nevertheless, the reported frequent side effects including taste perception alteration and an increase in tooth discoloration (**Wang et al., 2007 and Soares et al., 2011)** makes the use of CHX in dental practice questionable.

Also, fluoride is one of the most important and effective component in dental caries prevention programs **(Adair et al., 2006)**.The mechanisms by which fluoride prevents dental caries may involve at least two major routes (**Featherstone et al., 1999**); inhibition of tooth mineral dissolution by acid, and enhancement of remineralization in carious lesions. In addition, many studies have also shown that fluoride can affect the biological ability of *Streptococcus mutans* which is the one of the causative factor of dental caries (**Hamilton et al., 1990 and Marquis et al., 2003**).