

***An in vivo comparative study between
the bactericidal effect of photodynamic
therapy using Diode Laser and Non-
Coherent light
in young permanent teeth***

Thesis

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Dedication

*To my **great parents** to whom I am in debt everything.
They were always supportive and giving for many long
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*To my **loving husband** who sacrificed a lot to push me
forth.*

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Introduction

Introduction

Dental caries is an infectious microbiological disease of the teeth that results in localized dissolution and destruction of the calcified tissues. It is essential to understand that cavitations in teeth (destruction of the tooth surface, creating a cavity) are signs of bacterial infection. In clinical practice, it is possible to lose sight of this fact and focus entirely on the restoration of the lesions, thus failing to treat the underlying cause of the disease (i.e. the infection of the tooth from odontopathic bacteria) and this will allow the disease to continue.(1)

While the role of bacterial activity in the genesis of carious lesions is well defined, one group of bacteria *Streptococcus mutans* (*S. mutans*) which consists of eight serotypes, has been associated with the onset of caries. (1)

The atraumatic restorative technique (ART) uses only hand-instruments to remove dental caries, after which the cavity preparation is usually restored with a glass ionomer cement.(2)

However, there was no attempt to kill the bacteria without dentine removal. It would be clinically advantageous to maintain partially demineralized dentine if the bacteria could be eliminated. (3)

An alternative technique to traditional antimicrobial chemotherapy is the photodynamic therapy (PDT) that involves the use of light to kill the cells that are previously treated with a photosensitizing agent. (4)

PDT can be carried out by laser as well as a variety of non coherent broad band light sources. The important requirement for any photodynamic therapy light source is that its emission spectrum includes the activating wavelength for the photosensitizer being used.(5)

Diode laser is a semiconductor chip that works like an electrical diode. The diode laser operates at wavelength (650-900 nm). Diode laser has many advantages as being portable, light weight, reliable and cheap in price. (6)

The development of non coherent light sources, e.g. arc lamp, incandescent bulbs and fluorescent tubes, makes photodynamic therapy more practical. Additional advantages of these sources include the capability for exposing relatively large treatment fields.(7)

Recent studies have shown that a number of oral bacteria, including the cariogenic bacteria are susceptible to killing by light after sensitization with an appropriate photosensitizer.(8)

Methylene blue (MB) photosensitizer was applied to cutaneous microbial species (*Streptococcus pyogenes*, *Staphylococcus epidermidis*, and *Staphylococcus aureus*). The photodynamic inactivation was shown to be dose dependant when exposed to continuous wave radiation of visible light. This method may represent a useful alternative treatment to conventional antimicrobial treatment.(9)

Review
Of
Literature
