

Effect of root canal disinfection by laser and intra canal medicaments on the fracture resistance of teeth (An in vitro study)

Thesis

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By

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

﴿ قالوا سبحانك لا علم لنا الا ما علمتنا

﴿ انك انت العليم الحكيم

صدق الله العظيم

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Dedication

*To my great **father** and my lovely **mother**... the source of encouragement and inspiration to me throughout my life.*

*To my **brother** & my loyal **friends** for their special & great support and help.*

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❖ List of Abbreviations:

ANOVA	Analysis of Variance
E.faecalis	Enterococcus faecalis
Er,Cr:YSGG	Erbium, chromium, yttrium, scandium, gallium, garnet Laser
Er:YAG	Erbium, yttrium, aluminum, garnet Laser
FDA	Food and Drug Administration
HKS	Hydrokinetic system
IR	Infra-red
ISO	International organization for Standardization
LASER	Light Amplification by Stimulated Emission of Radiation
LDF	Laser Doppler Flowmetry
MTAP	Modified Triple Antibiotic Paste
Nd:YAG	Neodymium, yttrium, aluminum, garnet Laser
PBSC	Penicillin, Bacitracin, streptomycin, caprylate polyantibiotic paste
pH	Potential of Hydrogen
RFT	Radial firing tip
SEM	Scanning Electron Microscope
TAP	Triple Antibiotic Paste

INTRODUCTION

The eradication of the persisting bacteria in distant areas of the root canal system is a major challenge in nowadays treatment regimens. Despite the removal of most of the root canal irritants via chemo-mechanical cleaning and shaping, the complexity of the root canal systems, with the presence of accessory canals, fins and communications between main canals hinders the complete debridement, and disinfection of the root canal system.

The usage of intracanal medications in endodontic therapy is recommended for provoking root canal system disinfection by elimination and destruction of any remaining viable bacteria in the root canal system that have not been destroyed by the chemomechanical preparation processes. Calcium hydroxide is the most commonly used medication between visits in root canal treatment due to its strong antibacterial property which is attributed to its high pH.

Triple antibiotic paste which is a mixture of three affordable antibiotics (metronidazole, ciprofloxacin and doxycycline) had proved its antibacterial action in the root canal system.

With the introduction of lasers to the fields of conservative dentistry, it was shown that they were feasible and effective tools for cleaning and disinfecting the root canal system, particularly

because they helped to overcome the problem of insufficient depth of penetration of commonly used disinfecting agents.

Different laser types and wavelengths were used in root canal disinfection. Diode lasers emitting at 980 nm has many researches and clinical applications in endodontics because it has the ability to transmit energy through thin flexible fibers that are compatible with the dimensions and curved shapes of root canals. They have good penetration potential, with limited interactions with water and hydroxyapatite.

Erbium, Chromium: yttrium, scandium, gallium, garnet laser device that emits a laser beam having a wavelength of 2.78 μm through a radial firing tip, offering the ability of straight, clean and precise hard tissue cuts by virtue of laser tissue interaction with water at the interface of tissues.

Fractures in endodontically treated teeth have been understood to be multifactorial in origin. Exposure of root dentin to the root canal medicaments was shown to affect the physical and mechanical characteristics of the root dentin and subsequently affects its fracture resistance.

Most of the studies that concerned with laser application in endodontic treatment evaluated the effect of laser on dentin permeability, root disinfection and its thermal effect on dentin but

still there are few reports of the consequences of laser irradiation on the mechanical properties of dentin.

REVIEW OF LITERATURE