

**Evaluation of antimicrobial efficacy of four medicinal
plants extract used as root canal irrigant on
Enterococcus faecalis (An In-Vitro Study)**

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Master Degree in Endodontics.

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

﴿ قالوا سبحانك لا علم لنا الا ما علمتنا

﴿ انك انت العليم الحكيم

صدق الله العظيم
الآيه (32) سورة البقره

الآيه (35) سورة البقره

صدق الله العظيم

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Dedication

To the Soul of my Mother, who taught me that even the largest task can be accomplished if it is done one step at a time, and gave me unbelievable love and support. (I hope that this achievement will complete her dream and make her proud).

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Introduction

Success of endodontic therapy depends on many factors, starting from access cavity preparation, biomechanical preparation, and three dimensional obturation of the root canal system.

Eradication of the root canal infection is very important during endodontic treatment, since residual infection is one of the chief factors leading to post treatment failure. *Enterococcus faecalis* is one of the most frequently isolated microorganisms from endodontic infections. This is explained by its various survival and virulence factors; including its ability to compete with other microorganisms, invasion of dentinal tubules and resistance to nutritional deprivation.

Debridement of the root canals to remove all pulpal tissues and microbes contributes to a great extent to the success of root canal therapy.

The irrigants that are currently used during cleaning and shaping include sodium hypochlorite (NaOCl), chlorhexidine, hydrogen peroxide, ethylenediaminetetraacetic acid (EDTA) and a mixture of tetracycline, an acid and a detergent (MTAD). These chemical irrigants lead to many harmful accidents during treatment.

Because of the cytotoxic reactions of most of the commercial irrigants used and their inability to totally eliminate bacteria from root canals, trend of recent medicine attempts to use biologic irrigants extracted from natural plants.

Herbal products have been used since ancient times, involving both eastern and western medicinal traditions. Many plants with biological and antimicrobial properties have been studied since there has been a relevant increase in the incidence of antibiotic overuse and misuse. In dentistry phytomedicines have been used as anti-inflammatory, antibiotic, analgesic and sedative agents

Hence it seems beneficial to study and evaluate the antibacterial efficiency of some medicinal plants extracts when used as root canal irrigants on *Enterococcus faecalis*.

The medicinal plants used in this study were, Neem (*Azadirachta indica* A.Juss) leaves, Ginger (*Zingiber officinale* Roscoe) rhizomes, Miswak (*Salvadora Persica* L.) sticks and Lemon (*Citrus limonum* Risso) fresh solution.

Review of Literature

There is a direct relationship between the presence of microorganisms before the root canal obturation and the failure of the endodontic therapy⁽¹⁾. *Enterococcus faecalis* is commonly found in a high percentage of root canal failures and it is able to survive in the root canal as a single organism or as a major component of the flora^(2, 3).

Root canal irrigation plays an important role in the debridement and disinfection of the root canal system and is an integral part of root canal preparation procedures. The most frequently used irrigant is NaOCl⁽⁴⁾. Its good tissue dissolving and disinfecting capability have been demonstrated in several investigations⁽⁵⁻⁹⁾. However its use may lead to many accidents during endodontic treatment as damage to dentist or patient clothing, and contact with the patient's or operator's eyes results in immediate pain, profuse watering, intense burning and erythema⁽¹⁰⁾. Injection of sodium hypochlorite beyond the apical foramen may lead to immediate strong reactions with extreme pain, signs of hematoma, ecchymosis, profuse hemorrhage from the root canal and burning sensation felt by the patient⁽¹¹⁾, allergic reactions and hypersensitivity to sodium hypochlorite which may cause severe pain, burning sensation, lip and cheek swelling, ecchymosis, profuse hemorrhage from the root canal and breathing problems^(12, 13).

Role of medicinal plants in endodontics:-

Herbal products have been used since ancient times in folk medicine, involving both eastern and western medicinal traditions. Many plants with biological and antimicrobial properties have been studied since there has been a relevant increase in the incidence of antibiotic overuse and misuse. In dentistry Phytomedicines has been used as anti-inflammatory, antibiotic, analgesic and sedative agents⁽¹⁴⁾.

1- Neem (*Azadirachta indica* A.Juss), Family Meliaceae. نبات النيم

Chemical constituents of Neem leaf extract:-

Neem leaves contains as much as an oil rich in; Nimocinol, Nimocinolide, Isonimocinolide, Meldenin, Isomeldenin, Melianol, Zeeshanol, Zafaral, Meliacinol, Meliatetraone, Meliacinanhdyride, Meliateraolenone, Salanin, Nimbin, Azadirone, Azadirachtins^(15, 16).

Neem has been used as a medicinal agent for more than 2,000 years, about 75% of Ayurvedic remedies contains some form of neem, Indians call the sacred neem tree "the village pharmacy"⁽¹⁷⁾. All parts of the neem tree are used; flowers, seeds, fruits, roots, bark, and in particular leaves which were used to treat more than 100 diseases⁽¹⁸⁾. Even in Western medicine, the list of reported medicinal benefits in published studies^(18, 19) is extensive, and includes, antibacterial, anticarcinogenic, anticlotting, antifungal, antihepatic, antihyperglycemic, anti-inflammatory, antileprosy, antimalarial, antimicrobial, antimutagenic, antioxidant, antiparasitic, antipurgative, antirheumatic, antiseptic, antituberculosis, antiulcer, antiviral, antiworm, for boils, blood detoxifier, diuretic, for eye diseases, immunomodulatory, pimples and for skin diseases⁽¹⁷⁻¹⁹⁾.