Comparative evaluation of the antimicrobial activity of some natural herbal extracts (an *in vitro* study)

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Presented by

Mohammed Alamean Mohammed Taher Ahmed

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Ain Shams University

Faculty of Dentistry

Ain Shams University

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Supervisors

Dr. Shehab El-Din Mohamed Saber

Professor of Endodontics, Endodontic department, Faculty of Dentistry, Ain Shams University

Dr. Soha Abdulrahman El-Hady

Professor of Microbiology, Microbiology Department, Faculty of Medicine, Ain Shams University

Dr. Mohammed Mokhtar Nagy

Associate Professor of Endodontics, Endodontic Department, Faculty of Dentistry, Ain Shams University

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Dedication

To The Soul Of My Father.

To The Soul Of My Mother.

To My Beloved Sisters.

To My Soul Mate And My Beloved Wife.

To All My Friends And Colleagues.

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Introduction

One of the important objectives of root canal treatment is elimination of the microorganisms from the root canal system. *Enterococcus faecalis* is normally found in the human intestine, but may temporarily be found in the oral cavity, where they have been associated with pathogenic oral manifestations such as mucosal lesions in immunocompromised patients, and as superinfecting organisms in periodontitis and, most importantly, in persistent root canal infections. Several studies have shown that enterococci resist various intracanal treatment procedures. This is attributed to their ability to penetrate dentinal tubules, withstand high pH values, and possession of virulence factors. The use of an intracanal medicament helps in the elimination of bacteria, thereby providing an environment conducive for periapical tissue repair.

Cumulative studies have shown that *E. faecalis* is resistant to commonly used intracanal medicaments and that's why research should be directed to explore other alternatives.

Azadirachta Indica commonly known as Neem is used as traditional medicine *A. indica* demonstrated several biological Activities. Neem leaf extract possess antiviral, antioxidant, antiulcer and antifungal activity. Neem leaves, seeds and bark

possesses a wide spectrum of antibacterial action against Gram-negative and Gram-positive microorganisms.

Curcuma Longa known as Turmeric has been used for thousands of years as a dye, a flavoring agent and a medicinal herb. Turmeric has antimicrobial, antioxidant, astringent and other useful properties.

Myristica frangans known as nutmeg is native to the Spice Islands, located in Moluccas, Indonesia. In traditional medicine, the seed kernel (nutmeg) is widely used as astringent, hypolipidaemic, antithrombotic, antiplatelet aggregation and antifungal. In dentistry application, the seed has strong anticariogenic activity, possesses antibacterial effect against oral microorganisms also exhibits good antibacterial properties against Gram-positive and Gram-negative bacteria.

Green tea is the traditional drink of Japan and China and is prepared from the young shoots of tea plant *Camellia Sinensis*. The leaves from the tea plant contain polyphenolic components with activity against a wide spectrum of microbes. Green tea polyphenols have demonstrated antioxidant, anti-inflammatory and antimicrobial properties in numerous studies.

Tea tree oil (*Melaleuca alternifolia*) as it is more commonly known has many properties such as being an antibacterial, an antifungal agent and a mild solvent.

Therefore conducting a study to evaluate the antimicrobial activity of some herbal extracts as endodontic intracanal medicaments was thought to be of value.

Review of literature

Apical periodontitis occurring after endodontic Treatment presents a more complex etiologic & therapeutic issue than primary apical periodontitis. It is believed that intra-radicular infection is an essential cause of primary as well as a major contributor of post treatment apical periodontitis. *Enterococcus faecalis* is the most commonly implicated microorganism in asymptomatic persistent infections[1,2].

E. faecalis is a normal inhabitant of the oral cavity. The prevalence of *E. faecalis* is increased in oral rinse samples from patients receiving initial endodontic treatment, that midway through treatment, and patients receiving endodontic retreatment when compared to those with no endodontic history. *E. faecalis* is associated with different types of periradicular disease including 1^{ry} endodontic infections and persistent infections. The highly complex nature of the organism poses a great challenge for clinician.

I. Morphologic characteristics of *E. faecalis* and its prevalence in endodontic infection

Enterococcus faecalis is Gram positive cocci that occur singly in pairs or in short chains. It is a facultative anaerobe present in small proportion of the flora of untreated canal as a part of polymicrobial flora. It is a predominant bacteria implicated in root canal failures & persistent infections. [3,4,5] In post treatment apical periodontitis the prevalence ranges from 24% to 77%.[6,7]

Enterococci survive very harsh environments including extreme alkaline pH (9.6) and salt concentrations. They resist bile salts, detergents, heavy metals, ethanol, azide, and desiccation. They can grow in the range of 10 to 45°C and survive a temperature of 60°C for 30 minutes .[8,9]

Sundqvist et al [4] assessed type of microbial flora in teeth after failed endodontic therapy in vivo and established the results of conservative re-treatment. Samples of root-filled teeth with persisting periapical lesions were selected for re-treatment. After removal of the root filling, canals were sampled by means of advanced microbiologic techniques. The teeth then were retreated and followed for up to 5 years. They found that microbial flora was mainly single species of predominantly gram-positive organisms. The isolates most commonly recovered were bacteria of the species *Enterococcus faecalis*.