



Republic of Iraq
Ministry of Higher Education
and Scientific Research
University of Baghdad
College of Dentistry



THE COMBINATION EFFECT OF *NASTURTIIUM OFFICINALE* (WATERCRESS) EXTRACTS AND CALCIUM HYDROXIDE AGAINST *Enterococcus faecalis* AND *Candida albicans* ISOLATED FROM ROOT CANAL (IN VITRO STUDY)

A thesis

submitted to the council of the College of Dentistry at University of Baghdad in partial fulfillment of the requirements for the degree of Master Science in Oral Microbiology

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ABSTRACT

Background: The application of herbal extracts in endodontic therapy as antimicrobial agents has increased over the past few years. Apparent worldwide interest in the production of high-value phytochemicals that could be used as irrigants and intracanal medicaments. This new approach of using natural remedies termed phytotherapy or ethnopharmacology. *Enterococcus faecalis* and *Candida albicans* were extensively reported in the endodontic literature to be one of the most resistant pathogens in failed root canal treated teeth. Therefore, a pressing need was arisen to find a new antimicrobials with superior efficacy in order to promote complete eradication of these pathogens.

Materials and methods:

The study sample included 30 patient aged (25-45) years with necrotic root canals. *Enterococcus faecalis* and *Candida albicans* were isolated from root canal by paper points and identification was done according to colony morphology, microscopical examination (Gram stain) and Vitek 2 system was employed for diagnosis of *Enterococcus faecalis* and *Candida albicans* was diagnosed also by germ tube formation test.

Agar well diffusion method was used to study the antimicrobial activity of *Nasturtium officinale* (watercress) aqueous, alcoholic and oil extracts in different concentrations (5, 10, 15, 20) mg/ml on Mueller Hinton agar media inoculated with the tested microorganisms and compared with UltraCal XS (calcium hydroxide paste) as a control.

Determination of minimum bactericidal concentration (MBC) and minimum fungicidal concentration (MFC) of the extracts for tested microorganisms was done.

The study also tested the combination of *Nasturtium officinale* extracts in MBC or MFC value with calcium hydroxide to determine the antimicrobial

effect of this combination on the isolated pathogens in comparison with metapex.

Results:

All the prepared concentrations of the studied extracts revealed antimicrobial activity on *Enterococcus faecalis* and *Candida albicans* except the 5 mg/ml concentration of the aqueous extract showed no antimicrobial activity. The oil extract of *Nasturtium officinale* exhibited the highest growth inhibition capability followed by the alcoholic and then the aqueous extract. The minimum bactericidal concentration for oil, alcoholic and aqueous extracts was 1.25, 2.5, 10 mg/ml respectively on *Enterococcus faecalis*. While the minimum fungicidal concentrations for extracts on *Candida albicans* were 2.5 mg/ml for oil and alcoholic extracts and 10 mg/ml for the aqueous extract.

The studied combinations of the extracts with calcium hydroxide revealed a positive correlation between the plant extracts with Ca(OH)_2 . The oil extract combination showed the highest antimicrobial activity in comparison to metapex against the microorganisms included in the study.

Conclusions: *Nasturtium officinale* extracts had revealed antimicrobial activity against *Enterococcus faecalis* and *Candida albicans*. It could be used as effective natural source of antimicrobials against oral microorganisms.



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تأثير خليط مستخلصات الجرجير مع هيدروكسيد الكالسيوم ضد المكورات المعوية البرازية والمبيضات البيضاء المعزولة من قناة الجذر (دراسة مختبرية)

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الاحياء المجهرية الفموية

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