**Republic of Iraq**

**And Scientific Research**

**University of Baghdad**

**College of Dentistry**


# Antimicrobial Activity of Different Root Canal Sealers Contain Zinc Oxide Nanoparticles on The Growth of *Enterococcus Faecalis* ,*Candida* and Total Root Canal Microbiota

## (in Vitro Study)

**A Thesis Submitted to the council of the collage of Dentistry at the University of Baghdad in partial fulfillment of the requirement for degree of master science in oral microbiology**

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# Abstract

## Background:

A new science is Nanotechnology that has the ability to offer a wide range of uses and improved technologies for biological and biomedical applications. It is considered as the production, categorization, and exploration of materials in the nanometer ,*Enterococous faecalis* bacteria consider the most resistant bacteria to antimicrobial chemicals used in endodontic treatment and it the main cause of endodontic failure

The objective of this study was to evaluate the antibacterial activity of combination of zinc oxide nanoparticles with endodontic sealers

**Aim of the study:**

1- Study the antimicrobial effect of zinc oxide nanoparticles against *E.faecalis* ,*Candida* and total root canal microbiota

2- Evaluate the antimicrobial activity of guttaflow2 and sealers on the growth of *E.faecalis* ,*Candida* and total root canal microbiota in vitro

3- Study the antimicrobial activity of guttaflow2 and sealers that in combination with zinc oxide nanoparticles on the growth of *E.faecalis* ,*Candida* and total root canal microbiota in vitro

**material and methods :**

This study include 30 patients their age (20-40) years 18 female and 12 male diagnosed with necrotic root canal or failure of endodontic treatment ,the bacteria isolated from the root canal by paper point and send to microbiological lab and identified on agar and diagnosed by vitek 2 compact, 14 isolate diagnosed *Enterococous faecalis* and 10 isolate *Candida*.

Agar diffusion method used on agar to study the antimicrobial activity of ZNO NPs in different concentrations (2%-1%-0.5%-0.25%) on the brain heart infusion agar media inoculated with the tested microorganisms and compare with negative control ethanol(1-3)water.

The second experiment is agar dilution method was used to study the minimum bactericidal concentration for tested bacteria. Different concentrations of ZnO NPs were prepared in solvent (water 3:1 ethanol) and mixed with brain heart infusion agar media inoculated with the tested microorganisms and compare with negative control ethanol(1-3)water.

The third experiment is to evaluate the antimicrobial activity of endodontic sealers (guttaflow2, adseal and endofill) by agar diffusion method on brain heart agar inoculated with tested bacteria.

The forth experiment was the combination of ZNO NPs with sealers in concentration 1/2 and 1/4 MBC to determine the antibacterial activity of this mixing on the tested bacteria.

**Results :**

All the tested microorganisms was sensitive to ZNO NPs in all concentration that give highly significant results except (0.25%) was non-significant

The MBC for *E.faecalis* and *Candida* was (0.06%) ZNO NPs ,while for the total aerobic and anaerobic was (0.03%) ZNO NPs.

There is no antibacterial activity for the guttaflow2 on all isolates ,while endofill give large inhibition zone on all isolates were all isolates was sensitive to adseal except candida was resistant when ZNO NPs mixed with sealers in 1/2 and 1/4 MBC , the results reveal that all isolates were sensitive to this combination

**Conclusion** :

The combination of ZNO NPs with sealers enhance the antimicrobial activity of endodontic sealers (endofill and adseal),while the antimicrobial

activity of the combination of guttaflow2 and ZNO NPs result from the ZNO NPs that’s the guttaflow2 have not antagonistic effect on this mixing.