



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



STUDYING THE BEHAVIOR OF FAUJASITE AS COATING MATERIAL OF TITANIUM AND ZIRCONIA IMPLANT

A Thesis Submitted to Council College of Dentistry, Department of
Prosthodontics, University of Baghdad in partial fulfilment of the
requirements for a Ph.D. degree in Prosthodontics

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ABSTRACT

Background: many substitute materials could be used to replace the missing natural dentation such as the Titanium and Zirconia, especially in dental implantology. These selected materials may be alteration in surface morphology to improve their properties associated with osteointegration by increasing in bone formation around screws produced from dental implant materials and decreasing healing time.

The aim of the study: to assess the effect of Faujasite Nanoparticles coating to commercial pure Titanium (Grade II) (Cp Ti) and Zirconium dioxide (ZrO_2) implant surfaces via measuring removal torque new bone formation after two and six weeks of implant placement.

Materials and methods: determination the minimum inhibition zone for the nanoparticle Faujasite (intended coated material) against total anaerobic bacteria by agar well diffusion method.

In vitro study, circular discs of zirconia and titanium formed with diameter of 10 mm and thickness of 1 mm were coated with Faujasite in by using electrospinning method, then characterization different concentration of Faujasite (3 and 7 %) comparing with uncoated groups of both materials by using atomic force microscope test (AFM), wettability, fourier transform infrared spectroscopy (FTIR), elemental analysis with energy dispersive x-ray, phase analysis with x-ray diffraction (XRD), Field emission scanning electron microscope FE-SEM, Micro-Hardness test, and Thickness of coating.

In vivo study, after choosing better concentration of Faujasite in characterization properties which was 7 % of Faujasite and produced 160 screws of implant (80 Zirconia and 80 Titanium) was implanted in forty new Zealand rabbits, four implants for each rabbit, each femur contains two

ABSTRACT

Cp Ti groups (20 coated and 20 uncoated) and two ZrO₂ groups (20 coated and 20 uncoated),then each group divided into 10 mechanical and 10 histological examination for two intervals times (2 and 6) weeks after implants placement.

Results: the results obtained from disc characterization clarified that ZrO₂ and Cp Ti coated groups significantly better than uncoated group in microhardness, water contact angle, surface roughness, and thickness coating, in addition to that the values of these properties in coated ZrO₂ group was higher than coated of Cp Ti group.

Conclusion: Faujasite is an effective antimicrobial material could be coated on the surface of Titanium and Zirconium with percentage of 7 % by elect spun tool to improve hardness, surface roughness, wettability, and with good thickness coating comparing to uncoated.

In vivo study, the histology and histomorphometric analysis stated that coated the implant material (Titanium and Zirconia) with Faujasite particles could be enhance osteointegration as seen in new bone formation with the removal torque test comparing with uncoated groups, and proved the coated ZrO₂ implants were better than coated Cp Ti implants in mechanical and histological examination.



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