

**Ministry of Higher Education
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University of Baghdad
Collage of Dentistry**



Assessment of Calcium Carbonate Coating on Osseointegration of Commercially Pure Titanium Implant by Torque Removal Test and Histomorphometric Analysis

A Thesis

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ABSTRACT

Background: One of the most important methods to replace lost teeth is dental implants. In order to increase the strength of connection of the implant with the jaw bone to provide early loading after placement, implant is coated by different coating materials that achieved that purpose.

Objectives of the study: Evaluation of the influence of coating commercially pure titanium (CP Ti) implant with calcium carbonate on the strength of bone - implant interface after two and six weeks of implantation in rabbit femur bone by torque removal test, histological and histomorphometric analysis.

Materials and methods: Coating the surface of CP Ti screws with extra pure synthetic calcium carbonate via electrophoretic deposition method (EPD) was done. The surface of disc samples after coating was checked by optical microscopy, X-ray diffraction examination and measurement of coating thickness.

Ten male white French rabbits were prepared for implantation. Forty screws were implanted in the femur bone. Two implant screws in each femur bone, the first one was coated with calcium carbonate and the second one was uncoated. Rabbits were divided into two groups according to the healing periods 2 and 6 weeks (20 screws for each group). By torque removal, the strength of implant bond with bone (osseointegration) was measured. Single screw from each group was used for histological and histomorphometric analysis.

Results: There was a significant increase in mean value of torque removal test for screws coated with calcium carbonate (4.68 N.cm after 2 weeks, and 12.77 N.cm after 6 weeks) compared with uncoated screws (2.71 N.cm after 2 weeks, and 10.47 N.cm after 6 weeks). Histological examination showed an increase in the

growth of bone cells for coated screws after both period, and the histomorphometric analysis showed an increase in new bone formation percent (NBFP) (for coated implants was 4.71% and for uncoated was 3.65% after 6 weeks).

Conclusion: Coating the surface of the CP Ti implant with calcium carbonate via electrophoretic deposition method had great effect in increasing the osseointegration than uncoated surface.