

**Republic of Iraq
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College of Dentistry**



Biomechanical Effect of Nitrogen Plasma Treatment of Polyetheretherketone Dental Implant In Comparison To Commercially Pure Titanium

A Thesis

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Abstract

Background: Dental implants increase the quality of life for many patients with tooth loss, peek could replace titanium as dental implant, but its surface need to be modified in order to improve and accelerate osseointegration.

Aim of the study: to evaluate the effect of radio frequency nitrogen plasma treatment of peek implant screws on the strength of implant-bone interface after 2 and 6 weeks after implantation in rabbit tibia bone by torque removal test, histological examination and histomorphometry analysis.

Material and method: Peek discs had been prepared to be treated with radio frequency nitrogen plasma, then the surfaces of the discs examined by scanning electron microscope, energy dispersive X-ray spectroscopy examination to figure out the changes on the surface, and contact angle (wettability) measurements by drop of saline on the surface of the treated peek and compared to untreated peek.

Eighteen male New Zealand rabbits were chosen as implantation sites, fifty four screws were implanted in tibia bone, three screws in left tibia, first one nitrogen plasma treated peek implant, second was titanium implant, and the third was untreated peek implant, the rabbits were divided into two groups of two and six weeks according to healing intervals, twenty one screws were tested for torque removal of each group of implants in each periods, and six implants of each group of implants in each periods were used for histological examination and histomorphometric analysis.

Results: there was significant increase in values of torque removal for the nitrogen plasma treated implants in comparison with untreated peek implant for both periods of two and six weeks. Histologically revealed increased bone growth for both periods in nitrogen plasma treated peek group, and the

histomorphometric analysis showed increased new bone formation percent for nitrogen plasma treated peek for both periods of two and six weeks.

Conclusion: plasma treatment of peek implant by RF device had remarkable influence in increasing the osseointegration than untreated peek implant.