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خلاصه مقاله:

The aim of this study is to evaluate the effect of the alveolar bone quality on von Mises stress at the bone-implant interface during occlusal loading. Four (۳D) finite element models of fully osteointegrated ۳-mm diameter × ۱۱.۵-mm length dental implant indifferent alveolar bone with different cortical bone thickness are created, using SolidWorks computer aided design software. The alveolar bone cortical-spongy bone ratio modelled includes I) ۹۰%-۱۰%, II) ۶۰%-۴۰%, III) ۴۰%-۶۰%, and IV) ۱۰%-۹۰%. These models are then exported to ABAQUS software and stress analyses are run under an occlusal load of ۷۰ N acting on the platform face of the dental implant. Results of this study show that the implants are subjected to similar stress distributions in all models; maximum stress values are confined in the outer cervical plate of the cortical bone around the neck. This could explain bone loss and implant de-osseointegration. Peak stresses are lowest in the model with ۹۰% cortical bone (۱۴.۲ MPa) and almost doubled in the model with ۱۰% cortical bone (۲۶.۶ MPa). The stress values gradually reduce towards the apical area, demonstrating masticatory force transfer from implant to bone. Furthermore, both cortical and spongy bone structures exhibit highest

stress values in the model with thinnest cortical layer. The high interfacial stress concentration near the implant-cortical bone junction could lead to bone failure or implant instability induced by fatigue or overload risk. Results of our study could be a first step towards the development of a clinical pre-operative planning tool for dental implantolgy.

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کلمات کلیدی:

Bone quality, Dental implant, ۳D finite-element analysis, stress

لینک ثابت مقاله در پایگاه سیویلیکا:

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