

**Dražan Kozak:**

**„The influence of mini-dental implant diameter and position on stresses in surrounding bone“**

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Abstract

This paper analyzed influence of different diameter and position of mini dental implants (MDIs) on the bending stress in surrounding bone of edentulous jaws by using of finite element analysis. Dental implants are most commonly made of titanium and its alloys, which have been biofunctional, biocompatible and not subjected to biodegradation. A decade ago MDIs (slim implants made of Ti90Al6Va4 alloy) have been introduced to dental market for the support of dentures. Understanding mechanical properties of both, bone and implant material has been very important to prevent rejection or fracture of the implant or bone resorption.

Modeling toothless jaws and properly attributing mechanical properties to bone is a demanding job because, from the mechanical point of view, bone is a composite material with different solid and liquid phases. Thus the structure of the bone tissue is complex, multi - phase, heterogeneous and anisotropic. The Simpleware software was of great help to solve such problems.

Using Finite element method (FEM) the equivalent stress in the bone surrounding the implant was determined. Stresses in the bone around the implant threads do not exceed 10 MPa. The maximum stress in the bone (4050 MPa) appeared around the neck of the implant, due to occlusal forces that bend the implant and thus put additional strain to the bone. The results of stress analysis have generally been satisfactory. The stress analysis of the implant with a changed position yielded to a conclusion that stress was approximately equal, which means that different positioning of mini dental implants in the bone does not play a significant role. Applying the stress analysis to the mini dental implants of larger diameter yielded to a conclusion that the stress in the surrounding bone was reduced, both, around the threads of implants, as well as around the implant neck.

Keywords: edentulous jaws, mandible, maxilla, mini dental implants, FEA, bending stress