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Innovation in dental materials, new models of dental mini-implants to support overdentures

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The mini-implants used in support of overdentures are still little explored in the scientific literature. The aim of this study was to develop and compare the effectiveness of two innovative dental mini-implant designs to support mandibular overdentures with a commercial model through primary stability and stress distribution. Thirty mini-implants were used (n=10): an experimental threaded model, an experimental helical model and a commercial model of the Intra-Lock® System. The experimental mini-implants were made in the dimensions of Ø 2.0 mmx10 mm in length, and submitted to a nanometric surface treatment. Mechanical performance was evaluated for primary stability by insertion torque (IT) and pullout test. Stress distribution was analyzed, through digital image correlation (DIC). The data were submitted to ANOVA and Tukey's test ($\alpha=0.05$). IT and pullout test presented statistical significance for all models ($p<0.05$), in which IT had higher values for the threaded mini-implant and maximum pullout force for the commercial model. Regarding the DIC analysis, there were higher stresses in the middle and apical third of the mini-implants, with significantly higher values ($p<0.05$) in the threaded mini-implants under the axial loading condition. Comparing mini-implant designs, the experimental threaded model presented comparable primary stability to the commercial model and higher stresses only in the apical third.

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