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Assessment of orthodontic mini-implant primary stability with various dimensions and designs (An In-vitro comparative study)

A thesis

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Abstract

Mini-screws, often referred to as temporary anchorage devices (TADs), became an accepted component of orthodontic treatment, and achieved outspread scope for enhancing better orthodontic outcomes, and their clinical success is largely depended on their primary stability. This in vitro study was designed to assess the primary stability of the mini-screws using the maximum insertion torque (MIT) and pullout test (POT), compare among three different manufactures with different designs and dimensions, and to evaluate the effect of the length and diameter of the mini-screw on the primary stability.

The sample of this study consisted of sixty self-drilling mini-screws from three different companies (KJ Meditech, Hubit, and Dentos), each type of these mini-screws was available in two different lengths (8 and 10) mm, and each length was available in two different diameters (1.4 and 1.6) mm. All the mini-screws were inserted in artificial bone block (sawbone) with dimensions (20*120*170) mm manually by using lutron torque meter, and the MIT and POT values were recorded and compared using one-way ANOVA and Tukey's tests.

The results showed that the mean values of the MIT and POT of KJ Meditech mini-screws were higher than those of Hubit and Dentos mini-screws respectively, and there was highly significant difference among these different companies; moreover, the mean values of MIT and POT were greater for mini-screws with dimensions (1.6* 10) followed by (1.6*8), (1.4*10), and (1.4*8) respectively.

In conclusion, the primary stability was higher in KJ Meditech miniscrews than Hubit and Dentos mini-screws respectively. Furthermore, the length and the diameter had positive effect on the primary stability, and the diameter showed greater influence on the primary stability than the length.