

UNIVERSITI TEKNOLOGI MARA

**PREDICTIVE MODELING OF
TOOTH ANGULATION AND
ALVEOLAR BONE THICKNESS IN
THE MAXILLARY AND
MANDIBULAR ANTERIOR TEETH:
A CBCT STUDY.**

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ABSTRACT

Introduction: Immediate implant placement into fresh extraction sockets has gained a lot of attention in implant dentistry. Besides proper risk assessment, the evaluation of tooth anatomy aids the clinicians in selecting the finest treatment protocol. Cone-beam computerized tomography (CBCT) scans have been reported to be a reliable technique to predict the existing bone condition to avoid compromising aesthetics. This study has evaluated the correlation of alveolar bone thickness and the radial inclination of maxillary and mandibular anterior teeth to serve as a success prediction in immediate implant placement. **Methodology:** A descriptive retrospective study of CBCT images on 400 teeth conducted on 62 Malaysian patients (287 female's teeth and 113 male's teeth; mean age: 46 years). The alveolar bone thickness and radial tooth angulation of all maxillary and mandibular anterior teeth were evaluated on the CBCT scan. The facial and palatal/lingual alveolar bone was measured at three locations (crestal, midroot, and apical). Based on the tooth angulation each tooth was classified into facially, centrally, and palatally/lingually positioned. Correlation between the alveolar bone thickness and radial tooth angulation was conducted, to formulate a predictive model. The significance level was set at 0.05. **Results:** The facial alveolar bone in the maxillary and mandibular anterior teeth is predominantly thin (< 1 mm) crestally. However, the palatal alveolar bone was thick at all the measured levels (>1 mm) except on the mandibular crestal incisors (< 1 mm). A general trend was observed of increasing palatal bone thickness from the incisors towards distal canines and from the crestal towards the apical level. A high percentage of maxillary and mandibular anterior teeth were palatally/lingually positioned. The maxillary anterior teeth were within the angulation 11-20° and mandibular 1-10°. All anterior maxillary and mandibular teeth angulation were found to correlate with the facial and palatal alveolar bone thickness at different levels, except canines not correlating with the facial bone. Based on the analysis, a new classification system was proposed for the radial plane tooth position as an anatomical clinical landmark for immediate implant placement. **Conclusion:** The facial alveolar bone thickness was predominantly thin. The palatal bone was mainly thick from crestal to apical. Tooth angulation has a great influence for optimal implant position. The predictive model formulated in this study can guide the clinicians regarding the anatomical characteristics when planning implant placement for the patient. **Keywords:** Alveolar bone, Sagittal angle, Tooth angulation, Immediate implant placement.

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