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CBCT Radiomorphometric Indices as Auxiliary Tool for Detection of Osteoporosis

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Objectives The purpose of the study was to determine whether the computed tomography mandibular indices, detected in cone beam computed tomography (CBCT) can be used for predicting the risk of osteoporosis.

Methods In the present study were included 201 postmenopausal females aged 52-91 years (average age 68.6±8 years), who undertook CBCT examinations due to dental implant planning.

Bone mineral density measurements (BMD) of lumbar spine and both femoral necks by dual energy X-ray absorptiometry (DXA) were performed. The worst T-score reading from both were considered and patients were divided into 3 groups: normal BMD, osteopenia, and osteoporosis. CBCT images were analysed with OnDemand3D Dental software. In cross-sectional CBCT images, the computed tomography mental index (CTMI) (inferior cortical bone width of the mandible) and computed tomography mandibular indices (superior (CTI-S) and inferior (CTI-I)) were determined in the mental foramen region.

To detect the differences between groups One-way ANOVA was used. Performance of indices to predicting osteoporosis was assessed by computing the area under the curve (AUC). Sensitivity (Se), specificity (Sp), PPV, NPV was calculated with dichotomous 2 × 2 tables.

Results Based on the DXA results, 65 females had normal BMD, while 99 exhibited osteopenia, and 37 were diagnosed with osteoporosis. Females with osteoporosis had a reduced CTMI (cortical bone thickness) compared to women with normal BMD group, respectively- osteoporosis (2,72± 0.74 mm), osteopenia (3.34±1.1 mm), normal BMD (3.54±0.92 mm); $p = 0.0001$. The other two indices did not show a statistically significant difference between the different BMD groups. The CTMI showed promising diagnostic performance: AUC=0.61, Se=79%, SP=54%, PPV=31.3%, NPV=90.6% to predict osteoporosis.

Conclusions Postmenopausal females with osteoporosis had reduced cortical bone thickness (CTMI). CTMI is a promising tool for identifying postmenopausal females at increased risk of osteoporosis.