Effect of Spatial Position in the Field of View on Dimensional Changes in Cone Beam Computed Tomography

M Panjnoush[1*], Y Kheirandish[1], N Zeini[2]
[1]*Department of Oral & Maxillofacial Radiology ,Tehran University of medical sciences , Iran*
[2] *Department of Oral & Maxillofacial Radiology, Rafsanjan University of medical sciences , Iran*

Introduction
This study aimed to assess the relation between dimensional changes and object location in the field of view (FOV) using cone beam computed tomography (CBCT).

Materials and methods
A custom-made phantom was fabricated from base plate wax. To analyze the accuracy of measurements in horizontal and longitudinal dimensions, aluminum squares (0.5 mm thickness, 10×10 mm dimensions) were constructed and placed in three levels (upper, middle, and lower) and five positions (central, right, left, anterior and posterior). This phantom was scanned using Asahi, Planmeca and NewTom CBCT systems. CBCT scans were measured three times by use of their corresponding software. Statistical analysis was performed using one-way ANOVA, post-hoc test and two-way ANOVA ($P<0.05$).

Results
The differences between the mean horizontal dimensions of different systems were not significant ($P=0.296$). However, the differences between the mean longitudinal dimensions of different systems were significant ($P=0.039$). The differences between the different positions and the mean horizontal and longitudinal dimensions were significant ($P<0.001$, and $P<0.001$, respectively). The differences between the mean horizontal dimensions and different levels were not significant ($P=0.51$), but the differences between the mean longitudinal dimensions and different levels were significant ($P<0.001$). The interaction effect of level and position on the accuracy of horizontal and longitudinal measurements was significant ($P<0.0001$).

Conclusions
We found statistically significant differences in most of our comparisons; however, these differences were not clinically significant. Therefore, CBCT could be an accurate device for measurement of dimensions of objects placed in different positions in the FOV.

Keywords: Cone-Beam Computed Tomography, Dimensional Measurement Accuracy, Orientation, Spatial.