

Comparison of absorbed dose of two CBCT device with intra and extraoral digital radiographies in target organs.

Talayi Pour AR¹, Hafezi L², Mianji F³, Hydarkhan Tehrani S⁴

¹ Professor, Oral and Maxillofacial Radiology Dept, and Member of Cranio Maxillofacial Research Center, Islamic Azad University, Dental Branch, Tehran, Iran

² Assistant Professor, Oral and Maxillofacial Radiology Dept, Islamic Azad University, Dental Branch,

³ Assistant Professor, Atomic Energy Organization of Iran

⁴ Radiologist

Abstract

Background and Aim: Accurate radiographic images are necessary for correct diagnosis and appropriate treatment plan. In patients with permanent teeth and is scheduled to receive comprehensive orthodontic treatment with full band and bracket setup, full mouth intraoral radiographic examination is recommended. Panoramic and lateral cephalometry radiographies are also among documents of patients which it refers as ORD or Orthodontic Radiographic Documentation. Due to reliable 3D images of CBCT, high geometric accuracy and reduce errors in linear and angular measurements, most recently its application in the field of dentistry, such as the use of implants, oral and maxillofacial surgery, orthodontics and endodontics is on the rise, so knowing the dose of target organs in different imaging modalities is essential.

Materials and Methods: In this experimental study, calibrated TLD (thermoluminescence dosimeter) was placed in 12 different phantom organ. Then digital panoramic imaging, lateral cephalometry, full mouth periapical and large FOV of two different CBCT units was applied. For reliability of the study, dosimetry was performed three times and then mean and standard deviation of the results were calculated and were analyzed with ANOVA statistical test.

Result: The highest absorbed dose was the right sub mandibular salivary glands with CBCT ASAHI by 4997 svμ followed by right ramus bone marrow with the CBCT ASAHI, and the lowest dose belongs to the frontal lobe of brain with digital intra-oral radiography which was 16 svμ. Total, obtained absorbed dose for ASAHI CBCT was more than NEWTOM CBCT. The absorbed dose for CBCT scanners were higher than digital intra-oral and extra-oral imaging.

Conclusion: Absorb organs dose in the head and neck with large FOV of CBCT imaging is more than digital intra-oral and extra-oral imaging. But when the additional information and detailed of CBCT is necessary for diagnosis and appropriate treatment plan, if it is possible, the ALADA should be consider while obtaining the scan.

Keywords: ConeBeam CT, dosimetry radiation, dental radiography