

Knowledge, Attitude and Awareness of CBCT and CT Among Dental Students in Chennai – A Questionnaire Study

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Abstract:-

Aim and Objectives: To assess the Knowledge, Attitude and Awareness of CBCT and CT among dental students across Chennai, Tamilnadu. **Materials and Methods:** A structured, self-administered online-based cross-sectional questionnaire study consisting of 15 relevant questions were used to assess among 155 dental students across Chennai, Tamilnadu through Google forms distributed on various social media platforms. The obtained data was analyzed using SPSS version 24.0, and any $P \leq 0.05$ was considered as statistically significant. **Results:** Of all 155 dental students enrolled in the study, majority of the dental students (86.4%) were familiar with the term CBCT among which 40% and 35.5% gained more Information about CBCT through lectures and seminars/CDE/Workshops respectively. 20% of the dental students were unaware of the radiation dose differences while a very low response rate was obtained about knowledge on pixels (34.8%), picture element (29%) and different sizes of field of view (FOV) used in CBCT imaging (45.2%). Though more than half of the dental students (51%) recommend CBCT for various dental application, 63.2% agree inadequate teaching at the undergraduate level on 3D imaging techniques (CBCT/CT), 78.7% had shown interest to attend courses pertaining to CBCT in the near future. **Conclusion:** The present study clearly shows lack of knowledge among dental students despite adequate awareness and positive attitude on various application aspects of CBCT/CT. This observation undoubtedly necessitates the need for inclusion of new technologies in the oral radiology curriculum, organizing CDE programs, training courses and workshops to increase the knowledge awareness and guide the future dental practitioners to apply three-

dimensional imaging technologies for better and accurate diagnosis.

Keywords:- Awareness, CBCT, CT, Dental Radiology, Diagnosis, Digital Imaging, Field of View, Radiation exposure.

I. INTRODUCTION

In dentistry, radiographic evaluation is critical for diagnosis and treatment planning. The inherent drawbacks of two-dimensional imaging is not limited to compressing the three-dimensional (3D) anatomical structures of the radiographed region into a two-dimensional one (2D) but also includes compromised magnification, image distortion, and superimposition, all of which contribute to structural misrepresentation [1, 2]. In such situations, Cone Beam Computed Technology (CBCT) or computed tomography (CT) scanners may be utilized to aid diagnosis, evaluation of disease severity, therapy planning and administration, and appropriate follow-up [3].

Computed Tomography (CT), a high-quality 3D imaging technology that has become widely prevalent in dental practice since its development in 1972 and is now recommended before various procedures for visualization of dental hard tissues as well as osseous structures in the oral cavity including dental pathologies [4, 5]. Though intraoral radiographs remains gold standard radiographic diagnostic tool that aid in detection of dental pathologies, these images does not provide complete and superior in-depth details as compared with CBCT/CT that delivers three-dimensional diagnosis and treatment planning information with a wide range of clinical applications. Furthermore, with high quality images and less radiation doses, introduction of CBCT in

dental and maxillofacial imaging specifically designed to capture the volumetric characteristics of the craniofacial region gives an excellent opportunities to dental surgeons to work accurately in a wider applications ranging from assessment of impacted third molar in proximity to vital structures, analysis of jaws for implant placement, evaluation of dento-facial region for and /or during orthodontic treatment, Temporomandibular joint disorders, dentoalveolar trauma, pulp and periapical pathologies including cysts, tumors, and abscess, detection and characterization of the bony aspects of periodontal disease, and endodontic applications [6, 7, 8, 9].

The usage of CT in dental practice was largely affected by its high cost, increased radiation exposure and limited accessibility whereas CBCT imaging is less expensive, require minimal space than CT scanners, produces rapid high quality images at short scanning time with beam limited to head and neck region, reduced magnitude of irradiated areas, decreased radiation doses and also possess multivariate display modes to enhance ideal imaging despite poor soft tissue contrast, beam hardening artefacts and scatter artefacts from previous restorations and metallic crowns [10, 11]. Thus, clinicians and dental surgeons should use CBCT only when there is need and it cannot be taken adequately by lower dose conventional dental radiography or alternate imaging modalities [12, 13].

II. MATERIALS AND METHODS

A questionnaire-based cross-sectional assessment survey was carried out amongst the dental students (Final years, Interns, PGs) across Chennai, Tamilnadu to assess their Knowledge, Attitude and Awareness of CBCT and CT. After obtaining the Ethical clearance, the prerequisite information was collected and 15 relevant questions were prepared using available evidence-based literature about the present study. The self-administered questionnaire was distributed among undergraduate and postgraduate dental students with few selected responses to specific questions along with close-ended questions. Since this study was carried out during the COVID-19 Pandemic situation, online Google forms were generated and circulated through various social media platforms.

III. RESULTS

On analysis of the given data, it was observed that the majority of the dental students were Final year undergraduate dental students (58.7%) followed by CRRIs/Internship students (32.2%) and the least being postgraduate dental students (9.1%) respectively. Of all the 155 dental students enrolled in the present study, majority of the dental students (86.4%) were familiar with the term CBCT that stands for Cone Beam Computed tomography . On further evaluation of knowledge awareness towards CBCT/CT it was observed 40% and 35.5% gained more knowledge/Information about CBCT through lectures and by attending seminars/CDE/Workshops respectively (Figure 1) among which 67.1% prefer CBCT and only 17.4% opted CT for 3D imaging of head and neck region (Figure 2). About half of

the dental students (51%) reported low radiation dose of CBCT than CT as the most common reason for its preference however 20% were unaware of the radiation dose differences between them while a very low response rate was obtained about knowledge on matrix individual blocks in CT as 34.8% considered it as Pixel and 29% selected as picture element.

On assessment on attitude and practice awareness towards CBCT against CT in dentistry, majority of the dental students prefer CBCT for 3D imaging of head and neck region (67.1%), for locating the impacted maxillary canine (60%), while 40.7% recommend CBCT for detecting the morphology of root canal, and 27.1% for detection of number of canals in endodontic practice (Figure 3). One third of the dental students (34.2%) reported pleomorphic adenoma cases and 27.1% responded internal disc arrangement cases are absolute contraindication of CBCT in diagnostic imaging among which 36.1% considered in CT, patient will be in supine position; while in CBCT, and patient will be either standing or sitting position as the major technical difference exception between the two imaging procedures (Figure 4).

Majority of the dental students (63.2%) agree inadequate teaching at the undergraduate level on 3D imaging techniques (CBCT/CT) and lack of participation (72.9% never attended) in any CBCT related courses in the past or during the course of their dental education training as reasons for lack of sufficient knowledge (Figure 5) . It was also illustrated that more than half of the dental students (51.6%) recommended CBCT should be a part of dental curriculum and education in final year and 30.3% recommended CBCT as a part of third year (BDS) dental curriculum to gain adequate theoretical knowledge (Figure 6). Lack of awareness (34.8%) and lack of availability (34.2%) as a key factor for not using CBCT in their dental practice, among which 78.7% are willing to practice and had shown interest to attend courses pertaining to CBCT in the near future (Figure 7).

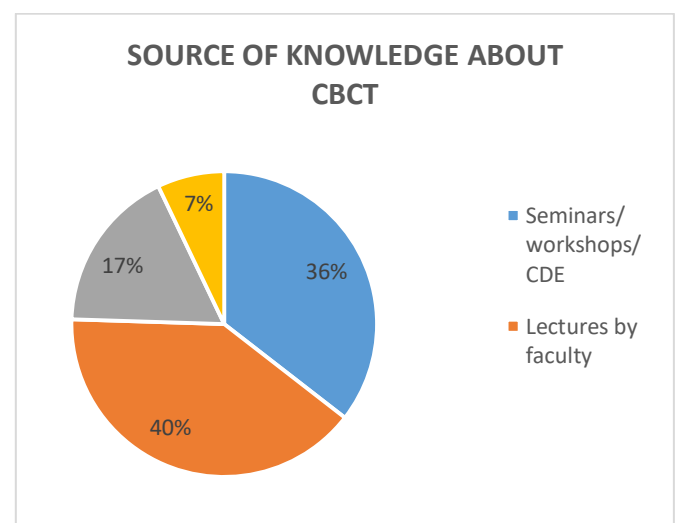


Fig 1 Pie diagram showing the source of knowledge about CBCT

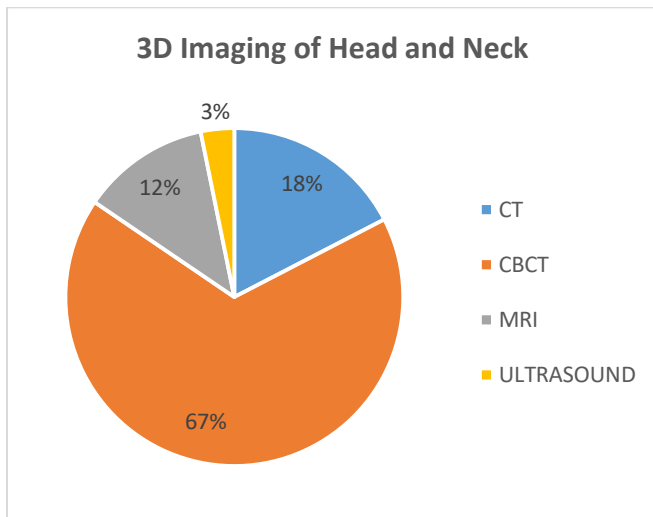


Fig 2 pie diagram showing the recommended 3D imaging techniques for head and neck

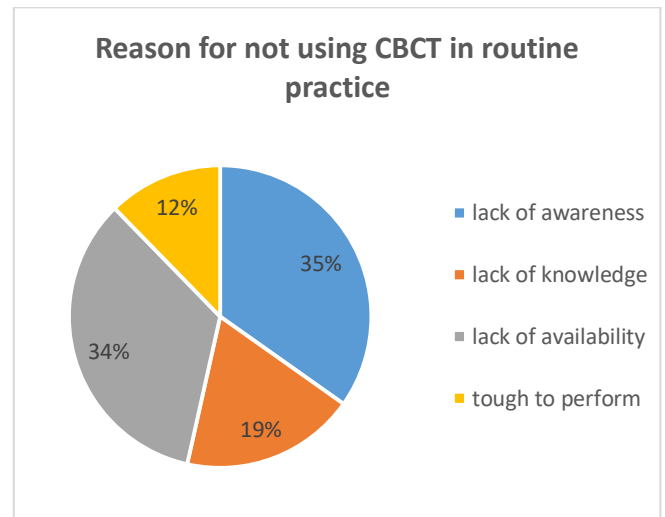


Fig 5 pie diagram showing the reason for not using CBCT in routine dental practice

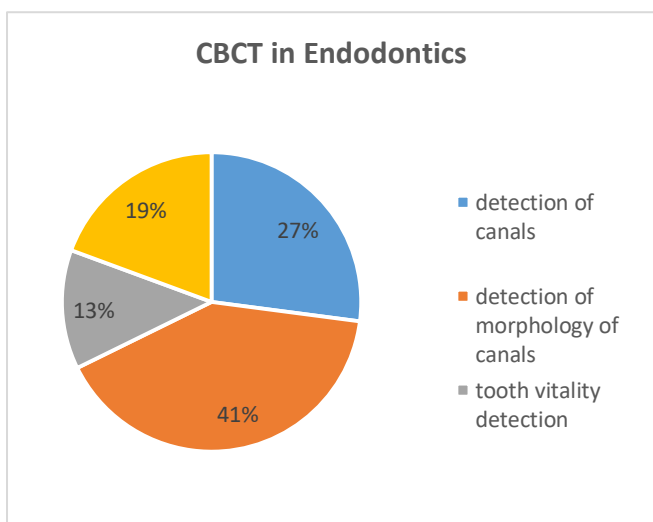


Fig 3 pie diagram showing the application of CBCT in endodontics

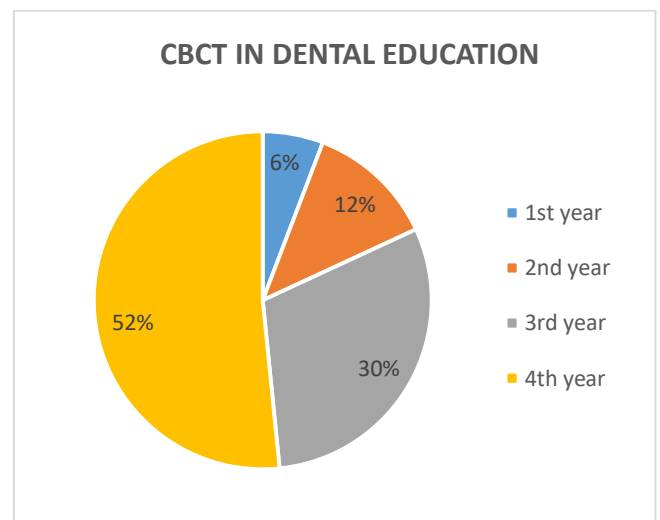


Fig 6 pie diagram showing the dental education in CBCT acquired in

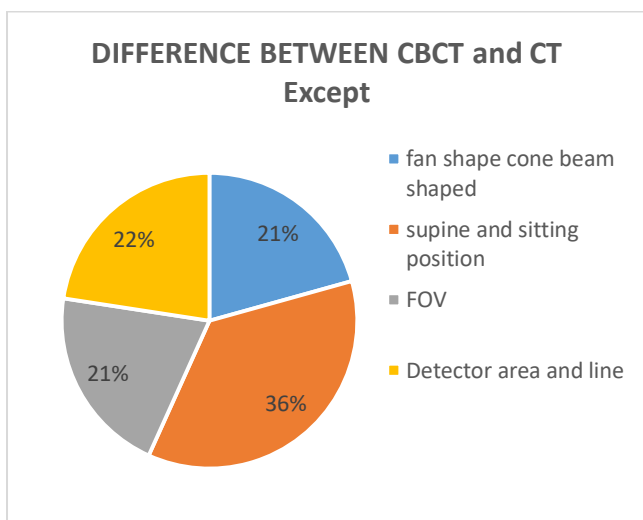


Fig 4 pie diagram showing the difference between CBCT and CT except

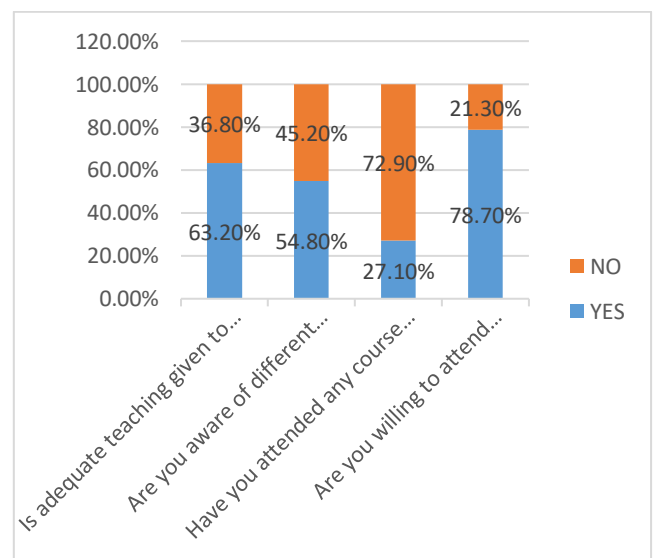


Fig 7 bar graph showing the yes or no responses

IV. DISCUSSION

Cone beam computed tomography (CBCT) has largely replaced CT and emerged as a key tool in 3-dimensional (3D) modality of choice in dental imaging and diagnosis. Though it has developed as an innovation in dental imaging, guidelines based on studies with low levels of evidence demanded additional research on CBCT effectiveness and its clinical implications as majority of previous studies focused largely on digital methods and radiation protection protocols. Very few studies evaluated knowledge, attitude and awareness among dental students towards their clinical application had shown clear lack of knowledge, awareness and hesitancy towards its use and diagnostic importance in routine dental practice [1-5]. This necessitated the inclusion of new technologies in the oral radiology curriculum to guide the future dental practitioners and apply three-dimensional imaging technologies for diagnosis and treatment planning. The present study used modified questionnaire to assess the knowledge and awareness on various application aspects of CBCT and CT and also to establish the importance of dental students' attitudes towards new technologies among undergraduate and post-graduates across Chennai, Tamilnadu.

In the present study majority of the dental students (86.4%) were familiar with the term CBCT among which 40% and 35.5% gained more knowledge/Information about CBCT through lectures and by attending seminars/CDE/Workshops (75.5%) respectively which was consistent with the studies conducted by Mahabob MN et al [1], Kamburoglu K et al [2] and Gunasekaran S et al [3] among which 67.1% prefer CBCT and only 17.4% opted CT for 3D imaging of head and neck region which was relatively higher than other studies carried out by Gunasekaran S et al [3], Lavanya R et al [4] and Almohiy H et al [5]. More than half of the dental students (51.6%) recommended CBCT should be a part of dental curriculum and education in final year and 30.3% recommended CBCT as a part of third year (BDS) dental curriculum to gain adequate theoretical knowledge which was similar to the results by Kamburoglu K et al [2], Gunasekaran S et al [3], and Lavanya R et al [4]. Majority of dental students owing to the fact that inadequate teaching at the undergraduate level on 3D imaging techniques CBCT/CT (63.2%) and lack of participation (72.9% never attended) in any CBCT related courses in the past or during the course of their dental education training as significant contributors for lack of sufficient knowledge.

Nearly half of the dental students (51%) reported low radiation dose of CBCT than CT as the most common reason for its preference however 20% were unaware of the radiation dose differences between them comparatively higher than previous studies by Kamburoglu K et al [2], Nagarale R et al [6]. Although CBCT has less radiation dose correlated to the conventional CT, studies by Silva MA et al [7], Grunheld T et al [8] reported that the effective dose of CBCT is several to hundreds of times more than the effective dose from plain two-dimensional dental imaging techniques. Li G et al stated that greater the field of view (FOV), higher the spatial resolution with higher effective dose suggesting a direct

relationship of image with the exposure factors [9]. A very low response rate was obtained about knowledge on matrix individual blocks in CT as 34.8% considered it as Pixel and 29% selected as picture element. Similar low responses (45.2%) were also reported on knowledge towards different sizes of field of view (FOV) used to take CBCT scan which was inconsistent with study by Nagarale R et al [6], Al-Noamam RF et al [10].

Balabaskaran et al [11], Sathawane R et al [12] in their respective studies showed majority of the dental students refer CBCT for various dental applications similar to our study where 67.1% opted 3D imaging of head and neck region, for locating the impacted maxillary canine (60%), while 40.7% recommend CBCT for detecting the morphology of root canal, and 27.1% for detection of number of canals in endodontic practice. Studies by Kamburoglu K et al [2], Gunasekaran S et al [3] and Shetty SR et al [13] were in agreement with our study results where dental students agree lack of awareness (34.8%) and lack of availability (34.2%) as a key factor for not using CBCT in their dental practice. It was evident that 78.7% are willing to practice and had shown interest to attend courses pertaining to CBCT in the near future comparatively lower than observations by Gunasekaran S et al [3] and Shetty R et al [13].

V. CONCLUSION

The present study clearly shows lack of knowledge among dental students despite adequate awareness on various application aspects of CBCT in comparable to CT. More than half of the dental students had shown interest to attend courses pertaining to CBCT signifies positive attitude towards implementing CBCT in routine dental practice. This necessitated the inclusion of new technologies in the oral radiology curriculum, organizing continuing dental education programs, training courses and workshops to increase their knowledge awareness and guide the future dental practitioners to apply three-dimensional imaging technologies for better and accurate diagnosis and management.

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