

## **Knowledge and Attitude towards CBCT among Dental Students, Interns and GDPs from College of Dentistry in Eastern Province of KSA - A Cross-Sectional Study**

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### **Abstract**

**Aim:** To evaluate the knowledge and attitude towards this advanced imaging technique CBCT among dental students and GDPs in Eastern province college, KSA.

**Materials and Methods:** To assess knowledge and attitude toward CBCT, a self-administered anonymous and close ended questionnaire consisting of 20 questions voluntarily administered to students attending clinical side, interns and GDPs of College of Dentistry in February 2019. The study groups were comprised of 52(4<sup>th</sup> year BDS students), 22 (5<sup>th</sup> year BDS students), 22 (interns), and 16 (GDPs).Collected data analysed with SPSS 23. The participants' response was assessed by using a chi-square test and significance level was set at  $P \leq 0.05$ .

**Results:** Out of 118 targeted participants, 114 participated and response rate was 96.6%. The majority of participants strongly agreed that the digital imaging has become essential part of dentistry (n=85, 83.9%) and awareness about CBCT was not similar among year 4 & 5 (79.7%), interns (91.7%) and GDPs (100%), and there was significant ( $p=0.01$ ) difference between their responses regarding CBCT awareness.

**Conclusion:** Considering the results of this study, students and GDPs accept that each dental institution should have CBCT unit. It also recommended that appropriate CBCT education should be included in dental UG curriculum.

**Keywords:** Attitude, CBCT, Digital Imaging, Knowledge, Radiation

## Introduction

In dentistry, radiographs have been availed of as an important diagnostic tool to detect various oral diseases.<sup>[1,2]</sup> Even though intra oral radiographs are helping in detection of the pathologies these radiographs are not able to give complete details in par with Computed Tomography.<sup>[3]</sup> When Computed tomography (CT) was introduced due to its cost, radiation and accessibility, its usage was limited in dentistry. However, with the introduction of Cone Beam Computed Tomography (CBCT) in dentistry it has made remarkable changes in the area of dental imaging.<sup>[4,5]</sup> The acquired three-dimensional information helps in diagnosis and treatment planning for a wide range of clinical applications.<sup>[6]</sup> With high quality images and less radiation doses, CBCT gives opportunities to dental surgeons and physicians to work accurately. CBCT most commonly used in dentistry for the purpose of analyzing dentition for dental implants, examination of teeth and facial structures for orthodontic treatment, pre-surgical assessment of proximity of mandibular third molar roots to mandibular canal, assessment of teeth and bones for infection, cysts and tumors. It also has applications in temporomandibular joint assessment to detect osseous changes.<sup>[3]</sup> However, it cannot be used for pathologies of the articular disc.<sup>[7,8]</sup> The few drawbacks of this imaging technology are limited soft tissue contrast, scatter artifacts from metallic crowns and restorations and beam hardening artifacts.

In comparison with CT scanners, CBCT units are less expensive, require less space, rapid scan time, x-ray beam limited to the head and neck, reduced radiation doses and have interactive display modes that makes them ideal imaging machine for dental practices.<sup>[9,10]</sup> But before

prescribing radiographic images, such as CBCT, a proper examination should be performed and therefore the patient's history and clinical examination must justify the utilization of CBCT by establishing that the advantages to the patient outweigh the potential risks. Clinicians should use CBCT only when there is need and it cannot be taken adequately by lower dose conventional dental radiography or alternate imaging modalities.<sup>[11]</sup> The European Academy of Dental and Maxillofacial Radiology has given guidelines for the use of CBCT in European countries. However, such guidelines are not framed in many countries.<sup>[4]</sup>

Earlier dental practitioners depended on 2D imaging techniques for diagnosis and treatment planning. These techniques required multiple exposures to acquire the needed data. However, with the advent of 3-D imaging technique, it has become easier to collect needed information with limited exposure.<sup>[5,8]</sup>

This new imaging technique is having ability to provide sub-millimeter resolution of images, high diagnostic quality and short scanning period. Because of these qualities, CBCT is becoming popular among dentists.<sup>[12]</sup>

According to online study conducted in USA and Canada, 34.2% of participants accepted that they started using CBCT.<sup>[6,7,11]</sup> The research concluded that dental practitioners were frequently using CBCT for diagnosis, treatment planning and post treatment follow up.

Even though the level of radiation dose is less in CBCT it is having some limitations. The information acquired from CBCT imaging needs a substantial level of expertise for interpretation. Without proper training in CBCT images interpretation, clinician may miss or end up in wrong diagnosis.<sup>[4,8,11]</sup>

Globally, there is a recent increase in the application of CBCT in various fields of dentistry it has become indispensable to the dental students to have awareness towards various aspects of CBCT.<sup>[13]</sup> Keeping this aim in mind, a self administered questionnaire with the objectives of:

1. To get an overview of the undergraduates understanding about CBCT
2. To evaluate the perception
3. To evaluate attitude towards CBCT.

Survey carried out among 4<sup>th</sup> & 5<sup>th</sup> students, interns and General Dental Practitioners (GDP) of Collage of Dentistry, King Faisal University, Alhasa, KSA.

## **Materials and methods**

The institutional ethical committee approval was obtained for this study design and the questionnaire. The research has been conducted in February, 2020 in accordance to the World Medical Association Declaration of Helsinki. This cross-sectional study was carried out among 5<sup>th</sup> & 4<sup>th</sup> year BDS students, interns and GDPs of College of Dentistry, King Faisal University, Al Hasa. As their curriculum is not having information about CBCT, we excluded first, second and third year students. The questionnaire was developed after reviewing previous relevant literatures. The questionnaire required consent to participate in this study. Confidentiality and anonymity were confirmed so that responses cannot be linked to individual participants. The questionnaire was designed to fulfill three objectives: to get an overview of the undergraduates understanding about CBCT, to evaluate the perception and attitude towards CBCT. To validate questionnaire a pilot study was conducted in a group of 15 participants. On the basis of results, the questionnaire was modified and validated with the help of relevant experts from the field of statistics and epidemiology. As the primary language of education in dental institutions of Saudi Arabia is English, the questionnaire prepared in English. A self-administered questionnaire was distributed in February 2019 among the participants and it had four parts: the first part was related to demographic data (gender and year of study). The second part consisted of questions to assess the undergraduates' knowledge about CBCT. The third part consisted of questions to evaluate their perception about CBCT and fourth part consisted of questions to evaluate their attitude towards CBCT. Prior to the survey participants have been given instructions on how to fill the questionnaire and they have been given 20 minutes to fill the forms. The participants were asked to fill the details in front of the observers so that the participants do not take the help from others, Out of 118 a total number of 114 participants took part in this study.

## **Statistical Analysis**

Data analysis was done with the help of SPSS program version 23.0 (SPSS Inc., Chicago, Illinois, USA). The difference in the student's response according to education level assessed using a chi-square test. A significance level was set at  $P \leq 0.05$ . Descriptive statistics calculated in terms of frequencies and percentages.

## Results

114 Dental students, interns & GDPs in College of Dentistry, King Faisal University, received the questionnaire to participate in the study and 4 of 4<sup>th</sup> year students were absent. The response rate was 96.6%, as 114 participated from 118. Hence overall 114 questionnaires were analyzed, which mainly constituted of undergraduates (UGS) including 4<sup>th</sup> year (n=52, 45.6%), 5<sup>th</sup> year (n=22, 19.3%), Interns (n=24, 21.1%) and General Dental Practitioners (GDPs) (n=16, 14%) (Table: 1) and their responses were tabulated (Tables: 2).

The majority of participants strongly agreed (Table:2) that the digital imaging has become essential part of dentistry (n=101, 88.6%) and majority of participants had awareness about CBCT (n= 99, 86.8%) with significant difference between them ( $P = 0.04$ ). The highest percentage of participants (87.7%, n=100) accepted that they have acquired information about CBCT from faculty lessons, and the least percentage (5.3%) of participants mentioned that they acquired the knowledge from seminars (Table: 2).

Majority of the participants have accepted that digital imaging is having advantages over non-digital techniques (n= 101, 88.6%), but interestingly 2% of the year 4 students were not with others (Table:2). This shows awareness among them increases with year of study. Regarding the question about advantages of CBCT in comparison with OPG 70.2% (n=80) have accepted that the CBCT is having advantages over OPG except 1.8% (n=2) of them not feeling the same.

For question no: 11 (Table: 2) about the quality of panoramic image quality derived from CBCT unit and OPG unit majority of them (n=54, 46.4%) had feeling of panoramic image derived from CBCT has good quality than OPG and only 14.9% (n=17) of them disagreed. Similarly, for question no: 12 (Table: 2) about their preference either CBCT or OPG for panoramic image interestingly majority of them (46, 40.4%) preferred CBCT derived panoramic images followed by neutral (n=45, 39.5%) and only 23.7% (n=23, 20.2%) of them were disagreed. These two questions help indirectly evaluate the level of technical aspect of the participants. For question no: 15 (Table: 2) about the radiation 53.5% of them disagreed that the CBCT is having less radiation than OPG. In question no: 13 (Table: 2) most of them (n=91, 79.8%) agreed that we have to give due weightage to ALARA principles while choosing option of technique.

According to the responses to the questions 18 & 19 (Table:2) most of the students, Interns

and GDPs agreed that there is a need of adequate teaching and training in the field of CBCT imaging in the undergraduate level of study. 69% of GDPs and 71% Interns had experience in advising CBCT for their patients. For question no: 21, 69% of GDPs and 29% of year 4 students accepted that they had experience of recommending CBCT for diagnostic imaging.

## Discussion

Cone beam computed tomography imaging has emerged as a pivotal application in 3-dimensional reconstruction for dental imaging. Though it has emerged as an innovation in dental imaging, there remains a lot of grey area regarding the application of this piece of technology. The literature has numerous structures, which assess the dental practitioner's knowledge on digital imaging.<sup>[14,15]</sup> Previous studies only evaluated dental students' knowledge regarding digital approaches and radiation protection.<sup>[16,17]</sup> Despite CBCT importance, only few studies evaluated dental student's knowledge and attitude towards it. Therefore, the present study used a modified questionnaire to evaluate CBCT knowledge and attitude among the 4<sup>th</sup> and 5<sup>th</sup> year students, interns of the BDS course and GDPs. This study performed in an institution, which is having CBCT facility for dental imaging. The opinion in the need to use CBCT increased as the knowledge of the tool increases. It was evident that most of the interns and GDPs mentioned that they would be using CBCT for imaging in their clinical practice while the same question when posed to 4<sup>th</sup> and 5<sup>th</sup> year students revealed lesser response. Another evidence to prove that the advancing experience, there is a clarity in the usefulness of this tool is evident by the response of the students for the question on preference of imaging technology. The most of wants to get more training and teaching about CBCT imaging technique.<sup>[18,19]</sup>

We found that the majority of participants had knowledge about CBCT (89.5%, n=102) and 10.5%(n=12) of them not had. But, awareness about CBCT was not similar among year 4 & 5 (79.7%), interns (91.7%) and GDPs (100%). There was a significant ( $p= 0.01$ ) difference between their responses.<sup>[20,21]</sup> Our result was not accordance with a study made in Turkey where the majority of participated dental students had heard of CBCT. Awareness of CBCT was identical between the fifth year and PGs but higher than 4<sup>th</sup> year students of Ankara University. However, Gazi University results shows that awareness of CBCT among PGs is higher than UGs ( $P= 0.00$ ). This result coincides with our study. In our study the highest percentage of all participants (78.9%, n=90) accepted that they have acquired information

about CBCT from faculty lessons, and the less number of them were from internet. This outcome was in disagreement with Kamburoglu K et al.,<sup>[22]</sup>

Regarding the question about advantages of CBCT over CT, it has been found that the majority of the participants accepted that advantage was less radiation dose (51.8%, n=59) and it's correlated with the results of study made in Ankara university (61.7%).

Li G.<sup>[5]</sup> described that the effective dose of CBCT varies from scanner type to another. CBCT radiation dose strictly linked to the exposure factors used for scanning for any CBCT machine, the greater the Field of View (FOV) and the higher spatial resolution used for imaging, the higher the effective dose consequently. 86.4% of students in the current study have accepted that the necessity of CBCT presence in every dental institution and this was very near to Kamburoglu K et al.<sup>[22]</sup> who found that the majority of participants (91%) said they wanted a CBCT unit at their faculty.

The American Academy of Oral and Maxillofacial Radiology (AAOMR) stated in a distinct opinion that dentists who use CBCT in their practices must have a complete knowledge of head and neck anatomy radiographically, as well as the ability to identify normal variants and disease. Consequently, the new tendency of teaching CBCT in oral radiology courses should acquaint students with three-dimensional anatomy and prepare them to interpret and investigate these scans during their dental work.<sup>[17]</sup>

## Conclusion

This study was conducted in a Dental Institution, which is having CBCT facility for dental imaging purposes. From this study, it has been found that there is presence of significant awareness about CBCT imaging among the participants and the GDPs and interns are having significantly higher awareness than the students. Since the availability and usage of CBCT rapidly increasing among the dentists, it is important to start the training on CBCT early and to help the students to attain diagnostic skills in the use of this technology.

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### Legends of Tables:

**Table 1: Demography of participants**

Gender	GDPs	%	Interns	%	Year 4	%	Year 5	%	Total	%
Male	7	6.1	11	9.6	52	45.6	22	19.3	92	80.7
Female	9	7.9	13	11.4	---	----	-----	----	22	19.3

**\*GDP --- General dental Practitioners**

**Table:2 Participants response to questionnaire**

Question No	Groups	GDP	Intern	Year 4	Year 5	P value
1: I am aware of that the digital imaging has become essential part of dentistry	S. Agree	15 93.7%	22 91.7%	44 84.6%	20 90.9%	0.65
	Agree	1 6.3%	2 8.3%	8 15.4%	2 9.1%	
	Neutral	-	-	-	-	
	Disagree	-	-	-	-	
	S. Disagree	-	-	-	-	
2: I had previous experience to digital imaging	S. Agree	5 31.3%	7 27%	44 84.6%	19 86.4%	0.00
	Agree	8 50%	12 50%	6 11.6%	3 13.6%	
	Neutral	3 18.7%	5 23%	2 3.8%	-	

	Disagree	-	-	-	-	
	S. Disagree	-	-	-	-	
3: Digital imaging having advantages over the non-digital techniques in dentistry	S. Agree	9 56.25%	12 50%	38 73.1%	18 81.8%	0.10
	Agree	5 31.25%	7 29%	8 15.4%	4 18.2%	
	Neutral	2 12.5%	5 21%	4 7.7%	-	
	Disagree	-	-	2 3.8%	-	
	S. Disagree	-	-	-	-	
4: I have information about CBCT	S. Agree	5 32%	5 21%	19 37%	9 40.9%	0.04
	Agree	11 68%	17 71%	22 42%	11 50%	
	Neutral	-	2 8%	11 21%	2 9.1%	
	Disagree	-	-	-	-	
	S. Disagree	-	-	-	-	
5: I gained information about CBCT from---	Seminar/workshops	2 14%	3 13%	-	-	0.14
	Lectures by faculty	13 81%	19 79%	48 92%	20 94%	
	Internet	1 5%	2 8%	4 8%	2 6%	
	Others	-	-	-	-	
6: CBCT is a non-conventional imaging technique	S. Agree	2 13%	2 8%	22 42%	4 18%	0.00
	Agree	-	-	14	11	

				27%	50%	
	Neutral	10 62%	15 63%	11 21%	4 18%	
	Disagree	4 25%	7 29%	2 4%	-	
	S. Disagree	-	-	3 6%	3 14%	
7: I prefer CT when I need 3D imaging of head and neck region	S. Agree	2 12%	2 8%	9 17.3%	4 18%	0.06
	Agree	10 63%	15 63%	18 34.6%	11 50%	
	Neutral	3 19%	5 21%	14 26.9%	2 9%	
	Disagree	-	2 8%	11 21.2%	3 14%	
	S. Disagree	1 6%	-	-	2 9%	
8: I prefer CBCT when I need 3D imaging of head and neck region	S. Agree	8 50%	12 50%	21 40.4%	11 50%	0.17
	Agree	8 50%	12 50%	19 36.5%	9 40.9%	
	Neutral	-	-	8 15.4%	2 9.1%	
	Disagree	-	-	4 7.7%	-	
	S. Disagree	-	-	-	-	
9: I think CBCT is a useful diagnostic tool in the field of dentistry.	S. Agree	5 32%	7 29%	35 67.3%	16 72.7%	<b>0.00</b>
	Agree	11	17	11	4	

		68%	71%	21.2%	18.2%	
	Neutral	-	-	6 11.5%	2 9.1%	
	Disagree	-	-	-	-	
	S. Disagree	-	-	-	-	
10: I think CBCT is having advantages over OPG.	S. Agree	8 50%	12 50%	29 56%	4 18%	<b>0.007</b>
	Agree	3 19%	5 21%	8 15%	11 50%	
	Neutral	2 13%	3 13%	13 25%	7 32%	
	Disagree	3 18%	2 8%	2 4%	-	
	S. Disagree	-	2 8%	-	-	
11: I agree that the quality of panoramic images obtained from CBCT is better than OPG.	S. Agree	3 18.7%	5 21%	17 33%	4 18%	<b>0.00</b>
	Agree	4 25%	10 42%	9 17%	2 9%	
	Neutral	9 56.3%	9 37%	4 8%	9 42%	
	Disagree	-	-	9 17%	4 18%	
	S. Disagree	-	-		4 18%	
12: I prefer panoramic images from CBCT unit rather than OPG unit	S. Agree	2 12%	2 8%	13 25%	-	<b>0.02</b>
	Agree	6 38%	10 42%	6 11.5%	7 32%	
	Neutral	6	10	18	11	

		37%	42%	34.6%	50%	
	Disagree	2 13%	2 8%	6 11.5%	2 9%	
	S. Disagree	-	-	9 17.3%	2 9%	
13: I think we have to give due consideration to ALARA principle before selecting imaging technique	S. Agree	7 43.75%	12 42%	23 44%	14 63.6%	0.204
	Agree	6 37.5%	10 42%	13 26%	6 27.3%	
	Neutral	3 18.75%	2 16%	16 30%	2 9.1%	
	Disagree	-	-	-	-	
	S. Disagree	-	-	-	-	
14: I believe that CBCT has advantage over CT in the field of dentistry	S. Agree	7 43.75%	8 33.3%	28 53.8%	2 9%	0.15
	Agree	6 37.5%	7 29.2%	12 23.1%	9 41%	
	Neutral	3 18.75%	9 37.5%	8 15.4%	9 41%	
	Disagree	-	-	4 7.7%	2 9%	
	S. Disagree	-	-	-	-	
15: I agree CBCT gives less radiation exposure to the patient than OPG.	S. Agree	-	-	-	-	0.11
	Agree	4 25%	5 20.8%	6 11.5%	4 18.2%	
	Neutral	7 43.75%	8 33.3%	17 33.7%	2 9.1%	
	Disagree	2 12.5%	7 29.2%	8 15%	9 41%	
	S. Disagree	3	4	21	7	

		18.75%	16.7%	40%	32%	
16: I agree CBCT gives less radiation exposure to the patient than CT.	S. Agree	7 43.8%	9 37.5%	19 36.5%	9 41%	0.87
	Agree	6 37.5%	8 33.3%	14 27%	6 27%	
	Neutral	3 18.7%	7 29.2%	17 32.7%	7 31.8%	
	Disagree	-	-	2 3.8%	-	
	S. Disagree	-	-	-	-	
17: I think CBCT is an essential imaging unit to be available in every dental institution	S. Agree	6 37.5%	10 41.7%	15 28.8%	4 18%	0.004
	Agree	3 18.75%	5 20.8%	12 23.1%	13 59%	
	Neutral	5 31.25%	7 29.2%	10 19.2%	4 18%	
	Disagree	-	2 8.3%	6 11.5%	1 5%	
	S. Disagree	2 12.5%	-	9 17.3%	-	
18: I think adequate teaching is necessary to the dental undergraduates regarding CBCT	S. Agree	7 43.75%	11 45.8%	25 48%	4 18%	0.04
	Agree	6 37.5%	10 42.7%	17 33%	9 41%	
	Neutral	3 18.75%	3 12.5%	6 12%	9 41%	
	Disagree	-	-	4 7%	-	
	S. Disagree	-	-	-	-	
19: I think CBCT	S. Agree	6	7	23	11	

should be a part of dental curriculum in undergraduate levels.		37.5%	29%	44%	50%	
	Agree	4 25%	7 29%	21 41%	9 40.9%	0.16
	Neutral	5 31.25%	8 33.3%	8 15%	2 9.1%	
	Disagree	1 6.25%	2 8%	-	-	
	S. Disagree	-	-	-	-	
20: Have you ever advised CBCT for any diagnosis?	Yes	11 69%	17 71%	15 29%	9 41%	0.001
	No	5 31%	7 29%	37 71%	13 59%	