

Knowledge and Attitude of Dentists and Dental Students Towards Cone-Beam Computed Tomography

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ABSTRACT

Background and Aim: The selection of an appropriate imaging or diagnostic technique is an important therapeutic step, which protects patients from the harmful effects of radiation. This study aimed to evaluate the knowledge and attitude of dentists and dental students towards cone-beam computed tomography (CBCT).

Materials and Methods: This analytical-descriptive study evaluated a closed-ended questionnaire consisting of 16 questions, which was given to 100 participants, including faculty members, postgraduate students, and interns of our institution. Their response was analyzed by chi-square test.

Result: In total, 100 questionnaires were analyzed. The mean age of the study population was 31.43±18 years (range: 23-45 years). Approximately 94% of the participants knew that the radiation dosage of CBCT is lower than that of CT. They obtained knowledge about CBCT through the committed dose equivalent (CDE), journals, seminars, internet, etc. Approximately 40% of the participants preferred CBCT scans for implant placement, 24% for trauma, 22% for cysts and tumors, and 14% for root canal treatment. About 54% of the participants considered CBCT as a part of the oral medicine and radiology domain and considered it necessary in oral and maxillofacial radiology departments only.

Conclusion: This study showed that the participants had the knowledge and a positive attitude towards the regular use of CBCT for various clinical applications. This study also suggests that CBCT training of dental students helps all dentists to improve the precision and reliability of oral and maxillofacial-related diagnosis, treatment planning, and prognosis by effectual use of this technology.

Keywords: Cone-Beam Computed Tomography, Surveys and Questionnaires, Radiography, Dental, Digital/Methods

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Introduction:

Radiological examination is essential for dentists to determine the presence and extent of dental diseases in patients. It also has a dynamic role in treatment planning, monitoring disease development, and assessing treatment efficacy.⁽¹⁾ The selection of an appropriate imaging or diagnostic technique is an important therapeutic step, which protects patients from the harmful effects of radiation.⁽²⁾

The introduction of cone-beam computed tomography (CBCT) to the dentomaxillofacial field has provided a novel platform for diagnosis and treatment planning assessments.⁽³⁾

In addition, CBCT has attracted a lot of attention in the field of oral and maxillofacial surgery for dental implant insertion, orthognathic surgeries, cysts, tumors, temporomandibular joint (TMJ) disorders, as well as endodontic treatment (for finding additional roots canals and vertical root fractures), orthodontic cases, and general dental care.^(4,5) CBCT provides a low radiation dose with lower costs and higher scanning speed compared to CT and promises a more appropriate imaging modality. Because of the field of view (FOV), the beam is limited to a smaller area, leading to a decrease in the radiation dose.⁽⁶⁻¹¹⁾

Dental nurses, dentomaxillofacial radiologists, radiographers, or especially trained dentists perform CBCT examinations.⁽¹²⁾ However, specialists have a higher knowledge of CBCT compared to general dentists, who have a general lack of interest in participating in oral radiology courses.⁽¹³⁻¹⁵⁾

As CBCT is the future of dentistry for diagnosis, treatment planning, and postoperative evaluation, dentists should have a thorough theoretical and practical knowledge of CBCT. Therefore, the present study was conducted to evaluate the attitude and knowledge of dentists towards CBCT.

Materials and Methods:

The present analytical-descriptive study involved 100 participants, including interns, postgraduate students, and faculty members of the Al Badar Rural Dental College and Hospital, Gulbarga, Karnataka, India. The ethics committee of the institution approved the study protocol. Informed consent was received from the participants. The study questionnaire contained 16 questions, including demographic data, knowledge-related questions, and attitude-related questions (Figure 1).

Name..... Age..... Gender...

Category: A. Postgraduate student B. Intern C. Faculty member

Qualification: Bachelor of Dental Surgery (BDS) Master of Dental Surgery (MDS)

Have you heard about cone-beam computed tomography (CBCT)/digital volume tomography (DVT)? Yes No

Are you aware of different sizes of the field of view (FOV) used to take CBCT scans?

A. Yes B. No C. No opinion

Are you satisfied with the use of CBCT?

A. Yes B. No

Knowledge-related questions

1. Which technology would you prefer when you need three-dimensional (3D) imaging of the head and neck region?

A. Computed tomography (CT)
B. Digital volume tomography (DVT)
C. Cone-beam computed tomography (CBCT)

2. How do you obtain knowledge about CBCT?

A. Lectures B. Committed dose equivalent

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(CDE) C. Internet

3. In what case would you refer your patient for CBCT?

A. Trauma B. Cyst/Tumor C. Implant D. Root canal treatment

4. How is the radiation dosage of CBCT different from that of CT?

A. Lower radiation dose than CT B. Same radiation dose as CT C. Higher radiation dose than CT

Attitude-related questions

5. What is the reason for not using CBCT in your dental practice?

A. Lack of awareness B. Lack of availability C. High costs D. Difficult to perform

6. Are you aware that focused FOV/small FOV should be advised in CBCT for endodontic purposes?

A. Yes B. No C. No opinion

7. Should oral and maxillofacial radiologists interpret all CBCT scans and sign all the reports?

A. Agree B. No opinion C. Disagree

8. Should patients be referred to a trained oral radiologist with enough experience in operating a CBCT machine?

A. Agree B. No opinion C. Disagree

9. Do you think that CBCT is a part of the oral medicine and radiology domain and should be present in oral and maxillofacial departments only?

A. Agree B. No opinion C. Disagree

Figure 1. The study questionnaire

The questionnaire was designed to be informative and provided multiple choices, from which, the participants were to choose one. At least four experts assigned the questions as transparent and appropriate. The reliability of the questionnaire was examined; the Cronbach's alpha coefficient of the items was higher than 0.8. The questionnaire was personally handed over to 100 participants, and a brief discussion to obtain clarification about the questionnaire sections was held.

Data were first analyzed by descriptive statistics shown as percentages (%). Chi-square test was used to determine the significance of the differences of the defined modalities. The level of significance was set at 5%.

Results

In the present study, the mean age of the study population (n=100) was 31.43±18 years (range: 23-45 years). In addition, 62% of the participants were female and 38% were male. Overall, 77% of the dentists were with a postgraduate degree and 23% were bachelor of dental surgery (BDS) graduates, including the interns. Of the 100 participants, 30% belonged to the intern group, 47% belonged to the postgraduate student group, and 23% belonged to the faculty group. About 94% of the participants knew that the radiation dosage of CBCT is lower than that of CT. They obtained knowledge about CBCT through the committed dose equivalent (CDE), journals, seminars, internet, etc. Approximately 40% of the participants preferred CBCT scans for implant placement, 14% for root canal treatment, 22% for cysts and tumors, and 24% for trauma.

CBCT was preferred by 75% of the participants, who needed three-dimensional (3D) imaging of the head and neck region. In total, 51% of the study population were not aware of different sizes of the FOV used to take CBCT scans. Overall, 76% of the participants believed that oral and maxillofacial radiologists should interpret CBCT scans and sign all the reports. In addition, 88% of the participants thought that patients should be referred to an oral and maxillofacial radiologist with enough experience in operating a CBCT machine. Finally, 54% of the participants held that CBCT is a part of the oral medicine and radiology domain and should be present in oral and maxillofacial radiology departments only. About 68% of the participants were aware that focused FOV/small FOV should not be advised in CBCT for endodontic purposes (Table 1).

Table 1. Statistical evaluation of the study population categorized into three groups: interns, postgraduate students, and faculty members

		Interns (N=30)	Postgraduate students (N=47)	Faculty members (N=23)	Chi- square	P-value
Three-dimensional (3D) imaging modality preferred in the head and neck region	CBCT	22	45	08	22.3	0.0001
	CT	00	02	00		
	DVT	08	00	00		
Obtaining knowledge about CBCT through	CDE	08	22	12	2.28	0.685
	Seminars/Journals	03	15	04		
	Internet	07	15	06		
Cases for referring patients for CBCT	Trauma	08	12	04	4.49	0.610
	Cyst/Tumor	09	07	06		
	Implant	11	20	09		
	Root canal treatment	02	08	04		
Radiation dosage of CBCT compared to CT	Lower	21	44	05	22.3	0.0001
	Equal	05	02	03		
	Higher	04	03	03		
Reasons for not using CBCT in your dental practice	Lack of awareness	02	04	01	21.44	0.003
	lack of availability	15	30	06		
	High costs	05	22	10		
	Difficult to perform	02	02	01		
Different sizes of FOV in CBCT scans	Yes	4	28	17	23.1	0.0001
	No	23	17	05		
	No opinion	03	02	01		
Focused FOV/small FOV of CBCT for endodontic purposes	Yes	04	21	07	8.3	0.016
	No	24	20	13		
	No opinion	02	06	03		
CBCT interpretation by oral radiologists	Agree	28	32	16	33.3	0.0001
	No opinion	06	02	05		
	Disagree	04	04	03		
CBCT is a part of the oral medicine and radiology domain	Agree	23	17	14	12.7	0.002
	No opinion	02	10	02		
	Disagree	05	20	07		
Referral of patients to trained oral radiologists with enough experience	Agree	30	41	17	8.44	0.015
	No opinion	00	02	01		
	Disagree	01	04	05		

CBCT=Cone-beam computed tomography, DVT=Digital volume tomography, FOV=Field of view, CDE=Committed dose equivalent

Discussion:

In the present study, the 100 participants were broadly categorized into three groups (interns, who were about to begin their professional career, postgraduates, who were specializing their proficiencies, and faculty members, who have mastered their proficiencies). The majority of the participants were young, indicating that young professional colleagues are leading the oral health care system in this part of the country. In the present study, 62% of the participants were female and 38% were male, showing a gradual increase in the number of females opting for dentistry as a profession. Overall, 77% of the dentists were with a postgraduate degree and 23% were BDS graduates. This high number of postgraduate dentists signifies the interests and awareness of BDS graduates to peruse post-graduation courses.

On the positive aspects of the study, 100% of the participants, irrespective of their level of education, had some idea about CBCT and preferred it when 3D imaging of the head and neck region was required. In general, 70% of the participants knew that the radiation dosage of CBCT is lower than that of CT. In our study, 62% of postgraduate participants had good knowledge of CBCT use in dental practice. Dölekoğlu et al showed that 56% of postgraduate dentists had good knowledge, and 30% referred their patients for CBCT.⁽¹⁴⁾ A study conducted by Yalcinkaya et al, evaluating the knowledge and attitude of dentists, demonstrated that 66.7% of postgraduate dentists had good knowledge of CBCT and 41.9% referred their patients for CBCT.⁽⁵⁾ In both of these studies, the lower radiation dose was given as the most important advantage of CBCT.^(5,14-16) This result was similar to that of our study.

In the current study, no correlation was found between age and knowledge of CBCT, which was inconsistent with the results reported by Ghoncheh et al and Yalcinkaya et al.^(5,17) This finding could be attributed to the recent recognition of CBCT as an imaging modality, limited availability of CBCT units, the lack of practical experience, and unfamiliarity with the image characteristics. Therefore, image acquisition and interpretation require consultation with an oral and maxillofacial radiologist.

We found that, due to a lack of practical exposure,

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the interns were less aware of the potential benefits and usefulness of CBCT. They had limited knowledge of CBCT. The postgraduate students had enough theoretical knowledge of CBCT but it was superficial due to a lack of practical exposure and the absence of a functioning unit. This study also showed that the faculty members have the knowledge and a positive attitude towards the regular use of CBCT in various clinical situations. This study proposes that training of dental students in the field of CBCT helps all dentists to enhance the accurateness and reliability of oral and maxillofacial-related diagnosis, treatment planning, and prognosis.

Conclusion:

This study indicated that the participants had the knowledge and a positive attitude towards the regular use of CBCT in various clinical situations. This study also suggests that CBCT training of dental students aids all dentists in using this technology to improve the accuracy and reliability of oral and maxillofacial-related diagnosis, treatment planning, and prognosis.

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