

**Knowledge of Dentists towards Cone Beam Computed Tomography in Delhi NCR Region – A Questionnaire Survey**

<sup>1</sup>Dr. Vikash Ranjan, Associate Professor, Department of Oral Medicine and Radiology, Divya Jyoti College Of Dental Sciences And Research, Modinagar.

<sup>2</sup>Dr. Shalabh Kaushik, Post Graduate Student, Department of Oral Medicine and Radiology, Divya Jyoti College Of Dental Sciences And Research, Modinagar.

<sup>3</sup>Dr. Soumendu Bikash Maiti, Senior Lecture, Department of Oral Medicine and Radiology, Divya Jyoti College Of Dental Sciences And Research, Modinagar.

**Corresponding author:** Dr. Vikash Ranjan, Associate Professor, Department of Oral Medicine And Radiology, Divya Jyoti College Of Dental Sciences And Research, Modinagar.

**Citation of this Article:** Dr. Vikash Ranjan, Dr. Shalabh Kaushik, Dr. Soumendu Bikash Maiti, “Knowledge of Dentists towards Cone Beam Computed Tomography in Delhi NCR Region – A Questionnaire Survey”, IJDSIR- April - 2020, Vol. – 3, Issue -2, P. No. 447 – 455.

**Copyright:** © 2020, Dr. Vikash Ranjan, et al. This is an open access journal and article distributed under the terms of the creative commons attribution noncommercial License. Which allows others to remix, tweak, and build upon the work non commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**Type of Publication:** Original Research Article

**Conflicts of Interest:** Nil

**Abstract**

**Background:** This questionnaire study aims to assess the knowledge of dentists towards Cone Beam Computed Tomography in Delhi NCR region.

**Materials and Methods:** The data in questionnaire were completely filled by 700 participants including Bachelor of Dental Surgery and Master of Dental Surgery working as researcher, faculty and/or general practitioners, interns, and postgraduates. It consisted of multiple choice questions on CBCT. Overall assessment of answers obtained for each part was analyzed category-wise, specialty-wise, and qualification-wise.

**Results:** A definite gap in knowledge of CBCT applications exists between different categories of dental specialists. Dental students should be provided with

appropriate CBCT education supported by practical experience and guidance of oral medicine and maxillofacial radiologists. It is also recommended that all the CBCT scans should be performed under the guidance of an oral radiologist and the interpretation of these scans should be done by a trained oral and maxillofacial radiologist.

**Conclusion:** From the study it is evident that dental practices are positively affected by high-end quality practice. More efforts for spreading awareness about this imaging modality, through inclusion of CBCT in curriculum of BDS and through lectures/Continuing Dental Education CDEs, should be undertaken to ensure better knowledge among dentists.

**Keywords:** Cone beam computed tomography, oral radiology, questionnaire

## Introduction

Selection of appropriate imaging or diagnostic technique is an important step in the treatment of diseases and protects the patient from harmful effects of ionizing radiation. [1] Constant research is focused toward better image acquisition with emphasis over minimum harmful effects of radiation. [2,3] Cone beam computed tomography (CBCT) in our country has gained popularity among dentists and is preferred imaging modality in recent times. However, lack of inclusion in the curriculum at both undergraduate and postgraduate (PG) levels in our system of dental education is a matter of concern. This survey study aims to assess the precise knowledge of CBCT in dental fraternity.

## Materials and Methods

Data were obtained in the form of a structured, close-ended, predesigned, self-administered questionnaire which was approved by the institutional ethical committee. (Table 1) The questionnaire was given to 700 participants comprising of dental students, undergraduate and postgraduate; dental teaching faculty and private practitioners practicing in Delhi-NCR region. The age range of the subjects was from 17 years to 60 years. The

Table 1: Questionnaire

	Questionnaire
1.	Gender:
	a) Male b) Female
2.	Qualification:
	a) BDS student (Intern) b) BDS c) MDS student d) MDS
3.	Do you use digital imaging modalities to make radiographs?
	a) Yes b) No
4.	Please specify your reasons to use digital imaging?
	a) Less radiation dose

survey was conducted for a period of one year from June 2017 to June 2018. The questionnaire consisted of multiple choice questions on CBCT. The total number of questions in the questionnaire comprised of 23 questions. Overall assessment of answers obtained for each part was analyzed category-wise into five categories that were Interns (UG), Post graduate Students (PG), Private Practitioners (PP), Private Practitioners as Teaching Dental Faculty (PPF) and Teaching Dental Faculty/Researcher (FR); Specialty-wise into nine specialties that were Oral Medicine and Radiology (OMR), Oral Surgery (OS), Pedodontics (Pedo), Orthodontics (Orth), Periodontics (Perio), Conservative Dentistry (Cons), Prosthodontics (Pro), Public Health Dentistry (PHD) and Oral Pathology (OP); and Qualification-wise divided as BDS or MDS. Statistical analysis was done using SPSS software version 21.0 (IBM, USA). Data were arranged in frequencies (percentages) for all questions and mean percentage was calculated. Chi-square and *t*-test were applied to compare percentages in different variables. Post hoc Bonferroni test was applied.

	b) Short time
	c) Easy to store data
	d) No developing required
	e) Adjustments and measurements can be made
	f) Any other specify
5.	Are you satisfied with the digital imaging modality available to you?
	a) Not at all b) A little c) No idea d) Satisfied
6.	Please check the reasons of not using digital imaging
	a) Expensive b) Do not know how to use computer c) No idea d) Hard to perform
7.	Are you aware of CBCT in dental radiology?
	a) Yes b) No
8.	How did you come across the term CBCT
	a) Seminars/workshops/CDE
	b) Lessons by faculty
	c) Internet
	d) Seniors
	e) Others (specify)
9.	Do you feel CBCT is a useful diagnostic tool in dentistry
	a) Yes b) No
10.	Do you feel CBCT will be the ultimate tool in future dentistry and research?
	a) Yes b) No
11.	To what extent do you believe CBCT will be used in routine dental practice in the future?
	a) It will not be used
	b) In all specialties of dentistry
	c) Limited use
	d) Selected dental applications only
	e) No idea
12.	In which year of under graduate dental education should CBCT be included?
	a) III BDS b) IV BDS C) Post Graduation d) Not required
13.	Do you feel frequent CDE/workshop should be conducted to acquire more knowledge on CBCT?
	a) Yes b) No c) May be
14.	Do you feel the necessity of having CBCT in the dental institution?
	a) Yes b) No
15.	Would you like to use CBCT in your future professional career?
	a) Yes b) No c) May be d) No idea

16.	What advantages do you feel will a CBCT offer over other diagnostic imaging modalities?
	a) Lower radiation dose compared to medical CT
	b) Short scanning time
	c) Image processing easier due to limited beam
	d) Less expensive
	e) Data reconstruction can be performed on a personal computer
	f) No idea
17.	For what cases would you like to use CBCT in your future professional career?
	a) Orthodontic assessment
	b) Implant dentistry
	c) Evaluation of cysts and tumors
	d) Evaluation of impacted teeth
	e) Trauma cases
	f) Any other(specify)
18.	Is adequate teaching given to the dental under graduate students regarding CBCT by the faculty?
	a) Yes b) No
19.	Have you attended any courses related to CBCT?
	a) Yes b) No
20.	Are you willing to attend courses pertaining to CBCT?
	a) Yes b) No c) Maybe if within budget
21.	Which one do you prefer when you need 3D imaging of head and neck region?
	a) CT b) CBCT if available
22.	Have you ever advised CBCT for any diagnosis?
	a) Yes b) No
23.	Are you willing to obtain any updated information regarding CBCT?
	a) Yes b) No c) May be

## Results

Of these 700 completed questionnaires 480 BDS pursuing & completed subjects and 220 MDS pursuing & completed subjects participated in the study. A series of

questionnaire related to awareness of CBCT was assessed qualification-wise, category-wise, and specialty-wise [Tables 2 and 3]

Table 2: Comparison of response – Category-wise & Qualification-wise

Q. No.	Response	Category-wise						Qualification-wise		
		UG	PG	PP	PPF	FR	p value	BDS	MDS	p value
3	Yes	76.1	86.4	89.1	96.7	99.1	0.001	78.7	98.1	0.001
4	Less radiation dose	49.3	85.9	92.1	92.9	95.7	0.001	87.4	91.4	0.001
5	Not at all	25.6	47.5	21.8	27.5	22.2	0.358	34.3	36.4	0.374
6	Expensive	21.3	77.3	57.4	78.4	83.2	0.001	23.3	75.3	0.001
7	Yes	79.7	89.7	92.1	93.3	97.1	0.023	82.4	94.1	0.033
8	Lessons by faculty	78.4	73.4	43.6	60.2	45.8	0.276	78.4	31.4	0.215
9	Yes	89.7	79.7	82.1	83.3	87.1	0.013	72.4	84.1	0.017
10	Yes	77.7	87.7	94.1	95.3	95.1	0.288	84.4	92.1	0.275
11	It will not be used	31.7	1.3	3.9	2.3	1.9	0.034	19.8	2.2	0.038
12	III BDS	68.7	78.8	67.3	59.2	79.1	0.046	74.6	78.5	0.041
13	Yes	94.2	89.7	92.1	93.3	97.1	0.184	90.2	96.7	0.186
14	Yes	78.3	89.7	92.1	93.3	97.1	0.028	81.2	94.6	0.037
15	Yes	88.7	88.8	87.3	89.2	89.1	0.492	90.3	92.4	0.475
16	Lower radiation dose	28.2	89.3	78.5	90.2	95.3	0.001	29.5	79.4	0.001
17	Orthodontic assessment	54.6	77.4	59.9	73.2	62.7	0.019	34.8	63.4	0.025
18	No	99.7	99.3	99.2	98.2	97.8	0.272	99.3	99.7	0.287
19	No	99.4	82.4	85.2	36.4	21.8	0.001	97.5	32.7	0.001
20	Yes	69.6	79.5	69.1	78.8	77.1	0.063	71.4	75.5	0.068
21	CBCT if available	43.7	83.7	88.2	91.6	94.2	0.001	32.7	89.5	0.001
22	Yes	21.2	79.5	86.4	91.1	89.3	0.044	32.7	90.2	0.041
23	Yes	92.5	98.3	97.8	99.2	98.4	0.629	93.7	98.5	0.635

Table 3: Comparison of response – Specialty-wise

Q. No.	Response	Specialty-wise									
		OMR	OS	Pedo	Ortho	Perio	Cons	Pro	PHD	OP	p value
3	Yes	100	98.2	98.8	98.9	97.3	99.8	99.2	75.5	77.8	0.001
4	Less radiation dose	100	48.2	82.3	74.2	54.5	62.9	38.8	22.4	27.2	0.021
5	Not at all	32.4	11.1	21.8	27.5	22.2	22.8	3.6	10.9	2.4	0.045
6	Expensive	63.8	68.5	57.4	78.4	83.2	57.4	78.4	83.2	78.7	0.033
7	Yes	99.2	88.9	92.1	93.3	97.1	89.1	88.7	93.1	89.2	0.172
8	Lessons by faculty	48.6	60.3	43.6	60.2	45.8	50.2	37.7	60.2	45.8	0.037

9	Yes	100	100	98.5	99.2	92.4	94.6	90.7	81.2	78.9	0.018
10	Yes	100	100	99.1	97.9	94.7	96.8	91.5	86.4	88.6	0.027
11	All dental specialty	88.5	34.5	5.7	17.3	40.2	4.2	3.4	28.3	17.4	0.013
12	III BDS	98.1	92.1	81.3	78.2	78.8	67.3	59.2	63.2	55.3	0.274
13	Yes	99.3	93.2	87.1	90.2	89.7	92.1	93.3	82.4	81.8	0.253
14	Yes	98.5	93.4	89.8	91.7	89.6	92.2	93.2	88.7	83.5	0.382
15	Yes	89.8	76.9	82.4	75.2	88.8	87.3	89.2	69.5	77.9	0.016
16	Lower radiation dose	100	94.3	83.6	93.7	89.3	78.5	90.2	78.5	80.3	0.001
17	Implant dentistry	100	98.3	94.7	96.3	88.5	87.2	89.7	86.3	88.4	0.042
18	No	89.5	92.4	78.5	78.4	80.4	96.2	93.5	97.4	98.3	0.018
19	Yes	98.4	90.3	45.7	23.9	11.1	20.4	19.6	18.3	23.4	0.001
20	Yes	71.3	68.5	68.3	77.5	29.2	65.4	74.8	63.8	69.5	0.016
21	CBCT if available	99.1	97.5	73.7	86.1	76.2	73.3	67.8	71.3	82.5	0.044
22	Yes	100	99.1	89.3	73.5	63.1	91.4	61.8	21.2	19.5	0.001
23	Yes	100	98.3	98.5	98.3	97.8	99.2	95.4	94.8	93.8	0.579

## Discussion

Several radiographic imaging techniques are available for diagnosis and treatment planning of patients visiting dental office for various dental procedures.[4-9] This study used a questionnaire to gauge the awareness about CBCT, among dentists. This study has sought to understand primarily how efficiently dentists follow principles and practices of traditional and modern oral radiology. It also assesses the knowledge of dentists about CBCT and their opinions on the implications of increased use of CBCT in their practices. Analyzing the results, a total of 700 completely filled forms were included, out of which Category-wise subjects were 338 Interns (UG), 116

Postgraduate Students (PG), 154 Private Practitioners (PP), 63 Private Practitioners as Teaching Dental Faculty (PPF) and 29 Teaching Dental Faculty/Researcher (FR). Specialty-wise MDS pursuing & completed participants were divided as 28 Oral Medicine and Radiology (OMR), 27 Oral Surgery (OS), 24 Pedodontics (Pedo), 22 Orthodontics (Orth), 26 Periodontics (Perio), 23 Conservative Dentistry (Cons), 25 Prosthodontics (Pro), 21 Public Health Dentistry (PHD) and 24 Oral Pathology (OP).

CBCT has an important role in the diagnosis of oral and maxillofacial pathologies with reduction in radiation dose. Category-wise, maximum participants in group FR

99.1% and least participants in group UG 76.1%; Qualification-wise maximum 98.1% MDS and minimum 78.7% BDS; Specialty-wise maximum 100% Oral Medicine and Radiologist and minimum 75.5% Public Health Dentist used digital imaging modalities to make radiographs. The findings were dissimilar to a study conducted by Aditya et al. [10] who found in their study that CBCT was less widely used in clinical practice due to low awareness regarding applications of CBCT among practitioners.

Category-wise 95.7% FR, qualification-wise 98.1% MDS, and specialty-wise 100% oral radiologist considered less radiation dose as a reason of considering use of digital imaging. The findings were similar to a study conducted by Chau and Fung. [11] They reported that CBCT delivers the lowest radiation dose to the organs, whereas spiral multislice CT delivers the highest dose.

Category-wise 47.5% PG, qualification-wise 36.4% MDS, and specialty-wise 32.4% OMR were not satisfied with the use of digital imaging modality available to them. Category-wise 83.2% FR, qualification-wise 75.3% MDS, and specialty-wise 83.2% PHD did not use digital imaging as it was expensive. Category-wise 97.1% PG, qualification-wise 94.1% MDS, and specialty-wise 99.2% OMR were aware of the use of CBCT in dental radiology. The findings were similar to a study conducted by Reddy et al. [3] Tofangchiha M et al. [12] to assess knowledge and attitude of dental fraternity toward CBCT in South India.

Category-wise 78.4% UG, qualification-wise 78.4% BDS, and specialty-wise 60.3% OS came across CBCT by lesson from faculty. Category-wise 89.7% UG, qualification-wise 84.1% MDS, and specialty-wise 100% OMR and OS felt that CBCT is a useful diagnostic tool in dentistry. Category-wise 95.3% PPF, qualification-wise 92.1% MDS, and specialty-wise 100% OMR and OS felt

that CBCT would be the ultimate tool in future dentistry and research.

Category-wise 79.1% FR, qualification-wise 78.5% MDS, and specialty-wise 32.4% OMR suggested that education on CBCT should be included in III BDS. Category-wise 94.2% UG, qualification-wise 96.7% MDS, and specialty-wise 99.3% OMR felt frequent CDE/workshop should be conducted to acquire more knowledge on CBCT. Category-wise 97.1% FR, qualification-wise 94.6% MDS, and specialty-wise 98.5% OMR felt the necessity of having CBCT in the dental institution. Category-wise 89.2% PPF, qualification-wise 92.4% MDS, and specialty-wise 89.8% OMR would like to use CBCT in their future professional career.

Category-wise 95.3% FR, qualification-wise 79.4% MDS, and specialty-wise 100% OMR felt that the main advantage of CBCT over other digital imaging modality was lower radiation dose as compared to CT. Majority of them wish to use CBCT for implants and impacted teeth.

Category-wise 99.7% UG, qualification-wise 99.3% BDS, and specialty-wise 89.5% OMR felt that adequate teaching was not given pertaining to the under graduate students regarding CBCT by faculty. Category-wise 99.4% UG, qualification-wise 97.5% BDS, and specialty-wise 98.4% OMR had not attended any course related to CBCT. Category-wise 78.8% PPF, qualification-wise 75.5% MDS, and specialty-wise 71.3% OMR were willing to attend courses on CBCT.

Category-wise 83.7% PG, qualification-wise 89.5% MDS, and specialty-wise 99.1% OMR were willing to use CBCT if available. Category-wise 79.5% PG, qualification-wise 90.2% MDS, and specialty-wise 100% OMR had at least prescribed CBCT once. Category-wise 98.4% FR, qualification-wise 93.7% BDS, and specialty-wise all the specialties were willing to obtain updated information regarding CBCT. Findings were in accordance with



Balabaskaran and Srinivasan [2] and Shetty et al. [6] who conducted a study to evaluate attitude of dentist toward CBCT and found in their study that dental practitioners prescribe CBCT imaging only when they expect that diagnostic yield will benefit patient care, enhance patient safety, or improve clinical outcomes significantly.

The findings are in accordance with a study conducted by Reddy et al. [3] in South India; however, Aditya et al. [10] found in their study that CBCT is still not very frequently used by dental specialists due to less availability of the technique, high cost, or inability of case selection for CBCT imaging by the dentists. The results indicate low awareness about CBCT among dentists and need enhancement of knowledge toward this promising new technology. Similar findings were reported in another study done in Turkey by Kamburoglu et al. [1]

Some other Category-wise PG student, qualification-wise MDS, and specialty wise OP think that CBCT is OMR domain and should be present in OMR department only and CBCT scans should be interpreted by oral radiologist and signed by oral and maxillofacial radiologist.

### Conclusion

Therefore, it was concluded that precise knowledge of oral radiology along with CBCT in dental fraternity is important due to its wide applications and profound potential of CBCT in different specialties of dentistry. Dental imaging is an essential tool for diagnostic and therapeutic orientation in the oral and dental surgery field. At student level introduction of training in CBCT at undergraduate and PG level shall ensure that dental specialists use this technique in an efficient way. Awareness of CBCT in dental fraternity and necessity to include it in the curriculum is the need of the hour. It is further recommended that OMR departments in different dental colleges should actively participate and organize special qualification programs for dentists to increase their

awareness toward different imaging modalities. Dentists including specialists from other specialties must gain more knowledge about indications and contraindications of CBCT for accurate diagnosis and better management of patients.

### References

1. Kamburoglu K, Kursun S, Akarsala ZZ. Dental students' knowledge and attitudes towards cone beam computed tomography in Turkey. *Dentomaxillofac Radiol* 2011; 40: 439-43.
2. Balabaskaran K, Srinivasan AL. Awareness and attitude among dental professional towards CBCT. *IOSR J Dent Med Sci* 2013; 10: 55-9.
3. Reddy RS, Kiran CS, Ramesh T, Kumar BN, Naik RM, Ramya K. Knowledge and attitude of dental fraternity towards cone beam computed tomography in south India – A questionnaire study. *Indian J Dent* 2013; 4: 88-94.
4. Sudhakar KM, Hemant RD, Kedar B, Amit T. Assessment of response of dental clinicians and patients towards different imaging modalities used in diagnostic evaluation of dental implant therapy. *Indian J Basic Appl Med Res* 2012; 1: 341-50.
5. Ramakrishnan P, Shaifi FM, Subash A, Kumara AEG, Chakkarayan J, Vengalath J. A survey on radiographic prescription practices in dental implant assessment among dentists in Kerala, India. *OHDM* 2014; 13: 826-30.
6. Shetty SR, Castelino RL, Babu SG, Prasanna, Laxmana AR, Roopassri K. Knowledge and attitude of dentists towards cone beam computed tomography in Mangalore – A questionnaire survey. *Austin J Radiol* 2015; 2: 1-5.
7. Mahdizadeh M, Fazelipour M, Namdari A. Evaluation of dentists' awareness of how to prescribe



- correct radiographs in Isfahan in 2010-2011. J Isfahan Dent Sch 2012; 7: 637-42.
8. Ardakani FE, Sarayesh V. Knowledge of correct prescription of radiographs among dentists in Yazd, Iran. J Dent Res Dent Clin Dent Prospects 2008; 2: 95-8.
  9. Mehdizadeh M, Booshehri SG, Kazemzadeh F, Soltsni P, Motamedi MRK. Level of knowledge of dental practitioners in Isfahan, Iran about cone-beam computed tomography and digital radiography. Imag Sci Dent 2015; 45: 133-5.
  10. Aditya A, Lele S, Aditya P. Current status of knowledge, attitude, and perspective of dental practitioners toward cone beam computed tomography: A survey. J Oral Maxillofac Radiol 2015; 13: 54-7.
  11. Chau ACM, Fung K. Comparison of radiation dose for implant imaging using conventional spiral tomography, computed tomography, and cone-beam computed tomography. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009; 107: 559-565.
  12. Tofangchiha M, Arianfar F, Bakhshi M, Khorasani M. The assessment of dentists' knowledge regarding indications of cone beam computed tomography in Qazvin, Iran. Biotech Health Sci 2015; 2: 1-5.