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Knowledge and attitude towards cone beam computed tomography (CBCT) amongst the dentist in Nagpur, Maharashtra

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Abstract

In India, cone-beam computed tomography (CBCT) has lately gained popularity as preferred dento-maxillofacial imaging modality by the dental practitioners in recent times. Optimal use of this technique cannot be assured without assessing the attitude and present status of knowledge of the dental practitioners in this field. So, as increasing availability of CBCT in dental practices and the importance of dentist's attitudes towards new technologies, So, the Cross sectional observational study was conducted amongst dental practitioners, post graduate students and academicians in Nagpur city. The survey in the form of web link which include validated questionnaire. Descriptive data was analyzed using SPSS version 18.0 in terms of frequencies and percentages and score was assigned to linguistic descriptors of agreement & weighted mean score was obtained which indicating the level of agreement amongst dentists. Statistical results showed there is a definite gap in knowledge of CBCT applications among the dental specialists. So, introduction of training of CBCT amongst dentist, by conducting well-structured training modules shall ensure that dental specialists should use CBCT in an efficient way to improve the accuracy and reliability in Oral and Maxillofacial diagnosis and treatment planning.

Keywords: Cone beam computed tomography, dental practitioner, questionnaire

1. Introduction

Cone Beam Computed tomography (CBCT) is an imaging modality that has recently become useful for dentomaxillofacial imaging. When compared with CT scanners, CBCT units cost less and require less space, have faster scan time, limit the beam to the head and neck with reduction in the radiation doses and have interactive display modes that offer 3D-maxillofacial imaging making them well suitable for use in dental practices [1]. On the other hand, the information obtained from CBCT imaging also requires a substantial level of expertise for interpretation. This implies that the untrained clinician is likely to have a substantial error rate in the interpretation of CBCT images resulting in a high percentage of missed or false positive diagnoses [2]. The European Academy of Dental and Maxillofacial Radiology has issued guidelines for the use of this technology in European countries. However, in many other countries, such guideline is lacking [3].

In view of the increasing availability of CBCT in dental practices and the importance of dentist's attitudes towards new technologies, this survey assessed the knowledge and attitudes regarding CBCT among dentists (practitioners, post graduate students and academicians) in Nagpur city.

Material and Methods

This Cross sectional observational study was conducted after getting approval from the Institutional Ethics Committee. The questionnaire was prepared and validated from the expert faculty from the department of oral medicine and radiology VSPMs Dental College & Research Centre, Nagpur and department of Preventive and Social Medicine NKPSIMS, Nagpur. The participant included in the study are willing dental practitioners, post graduate students and academicians from the different branches of dentistry in Nagpur. The survey in the form web link which include validated questionnaire will be send to the participants via email and social media like Facebook, WhatsApp etc... Descriptive data was analyzed using SPSS version 18.0 software in terms of frequencies and percentages & score was assigned to

linguistic descriptors of agreement & weighted mean score was obtained which indicating the level of agreement amongst dentists.

Results and discussions

Total 200 participants were found to be willing to participate in study which consists of leading dental practitioners, academician and post graduate students. They were representatives from almost every clinical branch of dentistry. The present study used a questionnaire to gauge the level of knowledge regarding CBCT among dental practitioners.

Among 200 dentists surveyed, 150 (74.9%) dentists are using conventional radiography, followed by 23 (11.6%) are using CBCT Table 1. Out of 200, 175 (87.4%) dentists routinely referred patients for CBCT imaging while 25 (12.6%) yet not referred Table 2.

By assessing the knowledge of dentists regarding CBCT and conventional radiography (CR) and Computed tomography (CT) Scan, we found that 63 (31.7%) dentists strongly agreed CBCT have lower radiation dose than CR, while 84 (41.7%) agreed, 21 (10.6%) were not sure, 18 (9.0%) disagree, 14 (7.03%) strongly disagree. With respect to CBCT having shorter scan time than CR, 59 (29.6%) dentists strongly agreed, while 78 (38.7%) dentists agreed, 18 (7.0%) were not sure, 33(16.6%) and 12 (6.3%) were disagree and strongly disagree respectively. 103 (51.25%) strongly agreed and 83 (41.7%) dentists agreed that CBCT image quality better than CR, while 5 (2.5%) dentist was not sure and 6 (3.0%) were disagree and 3 (1.5%) strongly disagree with it. 59 (29.64%) strongly agreed, while 78 (38.7%) dentists agreed that artifacts arising from metal restorations were less in CBCT than CR, while 30 (15.1%), 18 (9.0%) and 15 (7.5%) were not sure, disagree and strongly disagree respectively. For the statement 3D data reconstruction possible in CBCT and CR. Out of 200 respondents, 44 (22.1%), 64 (31.7%) dentists strongly agreed and agreed respectively while 16 (8.0%) not sure, 37 (18.6%) disagree and 39 (19.6%) were found strongly disagree.

On assessing the knowledge about CBCT and Computed Tomography (CT) scanning the frequency distribution of responses to statement 'CBCT have lower radiation dose than CT'. 126 (62.8%) strongly agreed, while 54 (27.1%) agreed that CBCT had lower radiation dose than CT imaging. In terms of scanning time, 114 (56.8%) dentists strongly agreed, while 58 (29.1%) agreed that CBCT had shorter scanning time than CT imaging. 83 (41.2%) strongly agreed, while 36 (18.1%) agreed that artifacts arising from metal restoration were more in CBCT than CT imaging. 117 (58.3%) strongly agreed, while 51 (25.6%) agreed that image resolution was better in CBCT than CT imaging. 100 (49.7%) strongly agreed, while 68 (34.2%) agreed that adjustment and measurements could be done in both CBCT and CT imaging. The Responses to statement 'CBCT is more expensive than CT'. Out of 200 respondents, 83 (41.2%) strongly agreed, while 47 (23.6%) agreed. Out of 200 dentists, 87 (43.2%) strongly agreed, while 39 (19.6%) agreed that data reconstruction performed on a personal computer in CBCT and CT imaging. 46 (23.1%) were not sure. 97(48.2%) strongly agreed, while 38 (19.1%) agreed that processing images was not required in both CBCT and CT imaging. 125 (62.3%) strongly agreed, while 55 (27.6%) agreed that CBCT imaging would be ultimate tool in routine dental practice in the future. 135 (67.3%) strongly agreed, while 49 (24.6%) agreed that frequently CDE/workshop should be conducted to acquire knowledge on CBCT imaging. Table 3.

A score of 1.0, 0.75, 0.5, 0.25 and 0.01 was assigned to linguistic descriptors of agreement. For a specific question, the number of cases voting for each descriptor were counted and the weighted mean score was obtained for the question indicating the level of agreement amongst practitioners. The agreement is stronger amongst practitioners that CBCT has lower radiation dose than that of CT (0.87) as compared to that of CR (0.71) Table 4.

The agreement is stronger amongst practitioners that CBCT has shorter scan time than CT (0.84) as compared to that of CR (0.67). The agreement on 'Image resolution is better in CBCT than CR' and 'Image resolution is better in CBCT than CT' is equally strongly amongst practitioner. Practitioners agree that artifacts arising from metal restorations are less in CBCT than CR as well as CT by indicated mean weighted score 0.69 and 0.70 respectively. Weighted mean score 0.72 indicates that practitioners that 3D data reconstruction is possible in both CBCT and CT, while they are not sure if it's possible in CR. Table 5. CBCT scanners represent a significant advancement in dental and maxillofacial imaging since their introduction to dentistry in the late 1990s (125). Almari HM reviewed that 540 articles on CBCT published in the last 12 years, 129 demonstrated clinical applications; most of these 129 articles related to oral and maxillofacial surgery, endodontics, implants, and orthodontics. Various Studies assessing dental practitioners and students' knowledge about dental radiology have focused mainly on digital systems and radiation protection. While the literature does include one study that evaluates the effectiveness of web-based instruction in the interpretation of anatomy using CBCT images, no information appears in the literature regarding dental practitioner's knowledge and attitudes about CBCT [4]. The present study used a questionnaire to gauge the level of knowledge regarding CBCT among dental practitioners, post graduate students and academicians.

A total of 200 dental specialists were invited to participate in the educational project, Out of the 200 participants, 82 participants were faculty at dental college, 60 postgraduate students also participated in the study and 58 were purely private practitioners. Among the specialists, there were 12 Oral physicians and maxillo-facial radiologists, 13 Endodontists, 9 Orthodontists, 9 Oral surgeons, 5 Pedodontist, 6 Periodontists and 4 Prosthodontists. Hence, there were representatives from almost every clinical branch of Dentistry. There was a wide variation in the work experience of the faculty and practitioners, ranging from 4 months to 21 years. All the participants were approached by direct visit and social medias like Facebook, WhatsApp and email id.

Initial questions were focused on their awareness regarding the CBCT. Amongst 200 participants, 82.5% participants routinely used conventional radiography (CR) as compared to CBCT. So, its suggest that dental practitioners more user friendly to CR than CBCT. Though they are routinely used CR, they do prescribe CBCT for management of certain special cases.

After assessing the awareness of use of CBCT we moved for the assessment of their knowledge in terms of agreement about CR versus CBCT and CBCT versus CT. By assessing the knowledge of dentists regarding CBCT and conventional radiography (CR) and Computed tomography (CT) Scan, we found that only 14 (7.03%) participants were aware that CBCT have higher radiation dose than CR. Maximum participants were lack the knowledge about the radiation dose of CBCT and CR.

Many of the practitioners about 29.6 % were aware that CBCT having shorter scan time than CR.

103 (51.25%) practitioner was strongly agreed that CBCT image quality better than CR. 59 (29.64%) strongly agreed, while 78 (38.7%) dentists agreed that artifacts arising from metal restorations were less in CBCT than CR. 53.8 % put a satisfactory agreement towards the 3D data reconstruction which were possible in CBCT. So after getting agreement about CBCT with respect to CR we come to dentist should make more aware about the technical knowledge of CBCT.

Now on assessing the knowledge about CBCT and CT scanning we came to know that participant was more aware and have more knowledge regarding the importance of CBCT over CT. They had also put the strong agreement towards CBCT as ultimate tool in routine dental practice and they are willing to frequently conduction of CDE/workshop to acquire knowledge on CBCT imaging.

Very few studies have been reported regarding the knowledge and attitude of the present day dental practice toward advanced maxillofacial radiographic imaging [5, 6]. Reddy *et al.* carried out a study to evaluate knowledge and attitude of dental fraternity toward CBCT in South India. They found that there was low awareness amongst the Dentists regarding applications of CBCT. They noticed the lack of availability of few CBCT centres in institutions in India as well as non-inclusion of CBCT training during dental education could be the possible causes of this low awareness. They recommended that owing to the vast usage of CBCT in various fields of dentistry, there is a need for well-guided and well-planned teaching programs to increase the awareness and knowledge⁷. Many literatures were shows that CBCT has a wide application in the field of dentistry [8, 9]. However, the majority of our participants either advised CBCT in less than 1/4th of their cases or did not advise CBCT at all. This may represent a conundrum amongst the dental specialists regarding applications of CBCT.

Kamburoglu *et al.* pointed that there was a very low awareness about CBCT amongst the dental students. They also suggested that efforts should be made to improve students' knowledge base regarding CBCT and that the dental school curriculum should devote more curriculum time to this promising new technology [5].

The responses to the above questions emphasized the absence

of complete and accurate information regarding CBCT, as it is a recent advancement in the field of oral and maxillofacial radiology. The optimum use of any technology is possible only when there is an understanding of the technical nuisances related to it. CBCT seems to have a tremendous potential as an imaging modality in the field of dentistry [9]. However, if there is a lack of awareness among the dental practitioners, its potential can never be explored to the fullest. All of the participants felt that there is a lack of the standardized training program in CBCT in India. There was only one participant who said that there is no need for such special training, but more information regarding CBCT shall be included in the existing dental curriculum.

After the assessment of the score analysis of the agreement of CBCT with CT and CR were performed it interpret over all good score report CBCT with CT but in relation to CBCT with CR they showed satisfactory level of agreement but poor level of knowledge.

The above survey indicates that there is a general need felt by the dental specialists to have a structured, detail and formal training in CBCT.

Table 1: provides frequencies distribution for digital imaging modalities. Out of 200, maximum i.e. 150 (74.9 %) dentists are using conventional radiography, followed by 23 (11.6%) are using cone beam computed tomography

Imaging techniques	No (%)
CBCT	11 (5.5)
CR (OPG & other extra oral radiography)	150 (74.9)
CR (OPG & other extra oral radiography), CBCT	23 (11.6)
CT	4 (2.0)
CT, CR (OPG & other extra oral radiography)	10 (5.0)
CT, CR (OPG & other extra oral radiography), CBCT	2 (1.0)
Total	200 (100)

Table 2: provides number of dentists referring patients for CBCT imaging. Out of 200, 175 (87.4%) dentists referred patients for CBCT imaging.

Have you ever referred your patients for CBCT imaging	N (%)
Yes	175 (87.4)
No	25(12.6)
Total	200 (100)

Table 3: Assessment of Knowledge for using CBCT scan over Conventional radiography (CR) technique (Q.1- Q.5) and for using CBCT scan Over CT Scan (Q.6- Q.15)

Sr. no.	Questions	Scale				
		Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
Q.1	CBCT have lower radiation dose than CR	63 (31.7)	84 (41.7)	21 (10.6)	18 (9.0)	14 (7.03)
Q.2	CBCT have shorter scan time than CR	59 (29.6)	78 (38.7)	18 (9.0)	33 (16.6)	12 (6.3)
Q.3	Image resolution is better in CBCT than CR	103 (51.25)	83 (41.7)	5 (2.5)	6 (3.0)	3 (1.5)
Q.4	Artifacts arising from metal restorations are less in CBCT than CR	59 (29.64)	78 (38.7)	30 (15.1)	18 (9.0)	15 (7.5)
Q.5	3D data reconstruction is possible in both CR and CBCT	44 (22.1)	64 (31.7)	16 (8.0)	37 (18.6)	39 (19.6)
Q.6	CBCT have lower radiation dose than CT	126 (62.8)	54 (27.1)	14 (7.0)	3 (1.5)	3 (1.5)
Q.7	CBCT has shorter scan time than CT	114 (56.8)	58 (29.1)	21 (10.6)	3 (1.5)	4 (2.0)
Q.8	Artifacts arising from metal restorations are more in CBCT than CT	83 (41.2)	36 (18.1)	43 (21.6)	31 (15.6)	7 (3.5)
Q.9	Image resolution is better in CBCT than CT	117 (58.3)	51 (25.6)	11 (5.5)	14 (7.0)	7 (3.5)
Q.10	Adjustments & measurements can be done in both CBCT and CT	100 (49.7)	68 (34.2)	14 (7.0)	11 (5.5)	7 (3.5)
Q.11	CBCT is more expensive than CT	83 (41.2)	47 (23.6)	21 (10.6)	31 (15.6)	18 (9.0)
Q.12	Data reconstruction can be performed on a personal computer in both CBCT & CT	87 (43.2)	39 (19.6)	46 (23.1)	19 (9.5)	9 (4.5)
Q.13	Processing of images are not required in both CBCT and CT	97 (48.2)	38 (19.1)	30 (15.1)	19 (9.5)	16 (8.0)
Q.14	Do you feel CBCT will be the ultimate tool in routine dental practice in the future	125 (62.3)	55 (27.6)	11 (5.5)	8 (4.0)	1 (0.5)
Q.15	Do you feel frequent CDE/ workshop should be conducted to acquire knowledge on CBCT	135 (67.3)	49 (24.6)	9 (4.5)	7 (3.5)	0

Table 4: indicates the weighted mean scores for different questions comparing CBCT and CR.

Questions	Score
	CBCT vs. CR
CBCT have lower radiation dose than CR	0.71
CBCT have shorter scan time than CR	0.67
Image resolution is better in CBCT than CR	0.85
Artifacts arising from metal restorations are less in CBCT than CR	0.69
3D data reconstruction is possible in both CR and CBCT	0.55

Table 5: indicates weighted mean scores for different questions comparing CBCT vs. CT

Questions	Score
	CBCT vs. CT
CBCT have lower radiation dose than CT	0.87
CBCT have shorter scan time than CT	0.84
Image resolution is better in CBCT than CT	0.82
Artefacts arising from metal restorations are less in CBCT than CT	0.70
3D data reconstruction is possible in both CBCT and CT	0.72

Equations

The data on digital imaging modalities used by different dentists was sought and the frequency distribution was obtained. The proportion of dentists referring patients for CBCT was obtained. The assessment of knowledge of dentists about CBCT scan over conventional radiography was obtained on 5-point Likert scale. Fifteen questions were framed to obtain their opinion to assess their knowledge. Further, a score of 1.0, 0.75, 0.5, 0.25 and 0.01 was assigned to each linguistic descriptor of agreement. For a specific question, the number of cases voting for each descriptor were counted and the weighted mean score was obtained for the question indicating the level of agreement amongst practitioners. Higher score indicates better agreement amongst dentists. All the analyses were performed using R-3.0.0. (R Core team, Austria) programming language.

Conclusion

Cone beam computed tomography (CBCT) is a relatively advanced imaging technique with a profound potential in the field of dentistry. This fact is now being realized and accepted by the dental specialists. The study results indicate that there is a definite gap in knowledge of CBCT applications amongst the dental specialists. The dental specialists themselves feel that there is a lack of awareness as well as training in this field, and strongly perceive a need for training in this field. Training in CBCT at undergraduate as well as Postgraduate level shall ensure that dental specialists use this technique in an efficient way to improve the accuracy of oral and maxillofacial diagnosis and treatment planning.

References

1. Sukovic P. Cone beam computed tomography in craniofacial imaging. *Orthod Craniofac Res* 2003; 6(Suppl 1):31-6.
2. Ahmed F. The efficacy of identifying incidental maxillofacial pathologies and anomalies using cone beam computed tomography by orthodontists and orthodontic residents. Ann Arbor: University of Michigan, 2009.
3. Horner K, Islam M, Flygare L, Tsiklakis K, Whaites E. Basic principles for use of dental cone beam computed tomography: Consensus guidelines of the European

Academy of Dental and Maxillofacial Radiology. *Dentomaxillofac Radiol* 2009; 38:187-95.

4. Almari HM, Sadrameli M, Alshalhoob MA, Sadrameli M, Alshehri MA. Applications of CBCT in dental practice: A review of the literature. *General Dentistry* www.agd.org Sept-Oct-2012 -390-400.
5. Kamburoglu K, Kursun S, Akarslan ZZ. Dental students' knowledge and attitudes towards cone beam computed tomography in Turkey. *Dentomaxillofac Radiol*. 2011; 40:439-43.
6. Wenzel A, Møystad A. Decision criteria and characteristics of Norwegian general dental practitioners selecting digital radiography. *Dentomaxillofac Radiol* 2001; 30:197-202.
7. 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*. 2012; 4:88-94.
8. Kobayashi K, Shimoda S, Nakagawa Y, Yamamoto A. Accuracy in measurement of distance using limited cone-beam computerized tomography. *Int J Oral Maxillofac Implants* 2004; 19:228-31.
9. Miles DA. The future of dental and maxillofacial imaging. *Dent Clin North Am*. 2008; 52:917-28.