Research Article

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Knowledge and Awareness of Dentist Towards Cone Beam Computed Tomography

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ABSTRACT

Introduction: Cone beam computed tomography (CBCT) is a three-dimensional imaging technique where wide cone shaped X-ray beam is used for scanning. It has several advantages over conventional computed tomography (CT) system and has become increasingly used in different fields of dentistry.

Objective: To assess the knowledge and awareness of CBCT among the dental practitioners and interns of Kathmandu Medical College and Teaching Hospital.

Materials and Method: A cross-sectional descriptive study was conducted among 90 dentists and interns of Kathmandu Medical College and Teaching Hospital through a self-administered questionnaire survey from July to September 2020. Data was analysed using Statistical Package of Social Sciences (SPSS) version 16 software.

Result: All the participants (100%) were aware of CBCT in dental radiology and among them, 89 (98.89%) participants considered it as a useful diagnostic tool in dentistry. The majority of the participants (54.44%) also believed CBCT had lower radiation dose compared to conventional medical CT. Eighty participants (88.89%) had adequate knowledge on various use of CBCT in dentistry. Teaching learning on CBCT during undergraduate course was found to be inadequate by 59 (65.56%) participants. Fifty-six participants (62.22%) had never attended any courses on CBCT and 80% of the participants felt the need for conducting frequent continuing dental education or workshops in future to acquire more knowledge on CBCT.

Conclusion: Knowledge and awareness of participants in this study was found to be inadequate and the need for courses and training to enhance further knowledge was acknowledged by most of them.

Keywords: Attitude; awareness; cone beam computed tomography; knowledge; radiation.

INTRODUCTION

Radiographs are always an essential tool in diagnostic assessment of the dental patients suspected of having dental or maxillofacial diseases and conditions. Cone beam computed tomography

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(CBCT) is a digital imaging technology where divergent cone shaped X-ray beam is used to produce three-dimensional images, which was at first used for angiography. Recently it has been used widely in dentistry for diagnosis and precise treatment planning.[1-5]

CBCT is a popular choice among dental professionals as it is smaller in the machine size, has short scan time, high spatial resolution and less ionising radiation exposure than conventional computed tomography (CT) scans. Clinicians should use CBCT only when the need for imaging cannot be answered adequately by lower dose conventional dental radiography or alternate imaging modalities. It has the ability to demonstrate limited contrast resolution and it is also not sufficient for soft tissue evaluation.[6,7]

In view of the growing availability and need of topographies in dental practices and the importance of dentists' awareness towards CBCT, this study gauged the knowledge and awareness regarding CBCT among dental practitioners and interns of Kathmandu Medical College and Teaching Hospital (KMCTH), Bhaktapur, Nepal.

MATERIALS AND METHOD

This was a questionnaire based cross-sectional descriptive study which was conducted among dental practitioners and interns of KMCTH, conducted over a period of three months (July to September 2020) after getting ethical approval from institutional review committee of KMCTH (Ref. 907202001).

Based on the study of Noaman et al.,[8] the estimated proportion of the population (p) was calculated 93.8% as awareness of CBCT, at 95% confidence interval and tolerated margin of error (d) of 5%, and using formula n=Z2p(100-p)/d2, the sample size was calculated as 89.36. Thus, we used 90 participants. Convenience sampling technique was used to collect data.

Participation was voluntary and participants who were willing to give written informed consent were included in the study. A comprehensive, closed-ended, self-administered questionnaire consisting of 27 questions was used to gather the socio-demographic characteristics, duration of practicing dentistry, and to assess the knowledge and awareness of CBCT among dental practitioners and interns. The questionnaires were adopted from previous studies[4, 9-12] and modified after suggestions from the experts. The obtained data was analysed using SPSS Statistics for Windows, version 16.0 (SPSS Inc., Chicago, Ill., USA) software.

RESULT

Among the 90 participants, 32 (35.56%) were male and 58 (64.44%) were female. The mean age of the participants was 28.56±5.71 years with range of 23 to 43 years. There were 62 (68.89%) graduate participants. Majority of the participants (63, 70.00%) had less than five years of experience in dental practice after graduation whereas 15 (16.67%) participants had five to 10 years, Nine (10.00%) participants had 11 to 15 years and three (3.33%) participants had 16 to 20 years of experience in dental practice. Among the 90 participants, 42 (46.67%) were interns and rest were dental practitioners.

Use of digital radiography in daily practice was seen in 85 (94.44%) participants. Most of the participants 26 (28.89%) chose all the reasons for using digital imaging like skipping developing process, possibility of digital adjustment and measurement, easy and quick image, less radiation dose, easy to store data, and short time for digital radiography. The most used digital modality was Orthopantomograph (OPG) by 49 (54.44%) participants followed by radiovisiography (RVG) by 31 (34.44 %) participants. Satisfaction upon using digital radiograph was seen in 47 (52.22 %) participants. Fifty-five (61.11%) participants had chosen the reason for not using digital imaging frequently as "it is expensive" (Table 1).

Table 1: Perception of respondents regarding digital imaging.

Questions	Response	n (%)
Do you use digital imaging modalities to make radiographs?	Yes	85 (94.44)
	No	5 (5.56)
Reasons to use digital imaging	Less radiation dose	9 (10.00)
	Short time	3 (3.33)
	Easy to store data	4 (4.44)
	No developing required	16 (17.78)
	Digital adjustments and measurements can be made	16 (17.78)
	Easy and quick digital image transfer	10 (11.11)
	All of the above	26 (28.89)
	Others	1 (1.11)
	Do not use digital radiography	5 (5.56)
Which digital imaging modality in dentistry you have been using the most?	RVG	31 (34.44)
	OPG/ TMJ views	49 (54.44)
	Lateral Cephalogram and other skull views	3 (3.33)
	CBCT	1 (1.11)
	Others	1 (1.11)
	Do not use	5 (5.56)
Are you satisfied with the digital imaging modality available to you?	Satisfied	47 (52.22)
	A little	33 (36.67)
	Not at all	3 (3.33)
	No idea	7 (7.78)
Reasons for not using digital imaging frequently?	Expensive	55 (61.11)
	Do not know how to use the imaging software	9 (10.00)
	Difficult to perform	1 (1.11)
	Not available in your region	9 (10.00)
	No idea	16 (17.78)

All the participants (100%) were aware of CBCT in dental radiology and among them, 89 (98.89%) participants considered it to be a useful diagnostic tool in dentistry. The source of information among 51 (56.67%) participants was undergraduate lectures. CBCT was believed to be used in all specialties in future by 55 (61.11%) of participants whereas 26 (28.89%) participants believed that it has selected dental applications only and eight (8.89%) participants believe that it has limited use.

Use of CBCT in future professional career was opted by 81 (90.00%) participants. Eighty (88.89%) participants felt the availability of CBCT in their working institution whereas 10 (11.11%) participants did not have any idea regarding this. Three-dimensional view of oral and maxillofacial structures was seen to be an advantage of CBCT according to 60 (66.67%) participants over other diagnostic modalities. On enquired upon the type of lesion/disorder, which one would advise CBCT, 77 participants (85.56%) would do that for bony and hard tissue lesions/disorders. Eighty participants (88.89%) would advise CBCT for orthodontic assessments, implant dentistry, endodontic evaluation, evaluate cyst and tumors, evaluation of impacted teeth, and evaluation of temporomandibular joint (TMJ) pathology. Among the participants, 63 (70.00%) participants have advised CBCT in their clinical practice and on an average, 88.89% of the participants advised up to five CBCT per month. When CBCT was compared with conventional CT in terms of its radiation dose and involved risk, 49 (54.44%) participants thought that CBCT had lower radiation dose and 29 (32.22%) participants have no idea regarding

Table 2: Awareness of respondents regarding cone beam computed tomography.

Questions	Response	n (%)
What brands of CBCT scanners you are familiar with?	Planmeca	15 (16.67)
	Kodak 9500	2 (2.22)
	Scanora 3D	1 (1.11)
	Dentsply Sirona	10 (11.11)
	No idea	62 (68.89)
Which CBCT viewer software is more user-friendly for interpreting CBCT images?	Planmeca Romaxis Viewer	13 (14.44)
	Carestream	2 (68.89)
	Sirona Sidexis	3 (3.33)
	Others	2 (2.22)
	No idea	70 (77.78)
Do you feel the teaching of CBCT for undergraduates is adequate?	Yes	14 (15.56)
	No	59 (65.56)
	May be	17 (18.89)
In which year of under graduate dental education should CBCT be included in dental curriculum?	III BDS	17 (18.89)
	IV BDS	68 (75.56)
	Post-graduation	5 (5.56)
Have you attended any courses related to CBCT?	Yes	34 (37.78)
	No	56 (62.22)
Do you feel frequent CDE/ workshop should be conducted to acquire more knowledge on CBCT?	Yes	72 (80)
	No	1 (1.11)
	May be	17 (18.89)
What type of CDE program would you like to attend on CBCT in future?	Hand-on course on CBCT equipment operations	9 (10)
	Hand-on course on CBCT application	3 (3.33)
	Hand-on course on CBCT interpretations	31 (34.44)
	Hand-on course on normal anatomy versus pathologic images	19 (21.11)
	All of the above	28 (31.11)

this. Half of the participants 45 (50%) knew that the major difference between medical CT (MD-CT) and CBCT was the low radiation dose of CBCT. Majority of the participants (81, 90%) were not aware of the international guidelines (SEDENTEXCT) for appropriate usage of CBCT. Sixty-two (68.89%) participants relied on radiologist's report for the interpretation of CBCT images.

The familiarity with any brands of CBCT scanner and CBCT viewer software was not found in 62 (68.89%) and 70 (77.78%) participants respectively. Among the brands available, Planmeca and Planmeca Romexis Viewer was familiar to 15 (16.67%) and 13 (14.44%) participants respectively. Teaching and learning on CBCT for undergraduates were found to be inadequate by 59 (65.56%) participants. CBCT was advised to be included in fourth year bachelor of dental surgery (BDS) curriculum by 68 (75.56%) participants. The participants who had never attended any course on CBCT were 56 (62.22%). The need for conducting frequent Continuing Dental Education (CDE)/workshop was felt by 72 (80%) participants to acquire more knowledge on CBCT. The CDE/ workshop preferred by 31 (34.44%) participants was to attend hand on course on CBCT interpretation in detail (Table 2).

DISCUSSION

In the present study, we came across most of the dental practitioners (94.44%) who are using digital radiography. Among them, the common reasons for using digital imaging were skipping processing

solutions of radiograph, possibility of digital adjustment and measurement. It was consistent with finding from study done in Saudi Arabia by Noaman et al. (2017)[8] where they found that 96.33% of the participants were using digital radiography.

In the current study, it was observed that all the participants were aware of CBCT and almost all of the participants considered it to be a useful diagnostic tool in dentistry. Most of the participants would continue using CBCT in their dental practice in the future. The need of CBCT in their working institute for better diagnosis and treatment planning was felt by 88.89% of the participants. Similar findings 92% and 100% has been reported by Lavanya et al. (2016)[9] - 92% and Shetty et al. (2015)[10] - 100%.

Among the participants, 88.89% of the participants advised 0 to 5 CBCT per month. In the study done by Lavanya et al. (2016),[9] it was found that 83% of the participants advised zero to five CBCTs per month. The increase in percentage in this study could be due to the unavailability of CBCT inside the working hospital itself.

Half of the participants (50%) thought that the major difference between CBCT and Conventional MD-CT was lower radiation dose whereas 44.44% of the participants had no idea indicating their lack of knowledge in this aspect. Similar finding was obtained by Shetty et al. (2015)[10] where 53% of the participants thought CBCT had lower radiation dose that MD-CT. Only 37.78% of the participants had attended some courses related to CBCT. Among the participants, 80% felt that frequent CDE/workshop should be conducted to acquire more knowledge on CBCT. The study done in Mangalore by Shetty et al. (2015)[10] reported that 47.5% of the participants had attended some course related to CBCT and 85.5% of the participants felt that frequent CDEs should be conducted.

Majority (59%) of the participants would like to attend hands on course on CBCT interpretation and 47% of the participants would like to attend hands on course on normal anatomy versus pathological images. As CBCT is an emerging field where most of the dentists would find it challenging to interpret the radiological images by themselves without the help of an expert justifies why majority of participants in this study wanted to learn about the interpretations. In the study done by Lavanya et al. (2016),[9] majority of the participants wanted to attend hands on course on CBCT interpretation versus pathologic image.

As the study was done among dentists of a tertiary care hospital, the findings cannot be generalised to whole population. Information and response bias are inevitable in questionnaire-based study hence adding to the limitations of the study.

CONCLUSION

Though most of the dental practitioners are familiar with digital imaging and CBCT in dentistry, the use of CBCT is limited in their clinical practice mainly due to unavailability of CBCT in working institute and as it is expensive. Knowledge and awareness of participants in this study was found to be inadequate and the need for courses and training to enhance further knowledge was acknowledged by most of them.

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Conflict of Interest: None.

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