Research Article

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Assessment of Knowledge and Awareness of General Dental Practitioners Towards Cone Beam Computed Tomography Used in Oral Implantological Procedures: An Original Research Study

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ABSTRACT

Background: Recently, three-dimensional imaging technique Cone beam computed tomography has established many landmarks in the field of dental radiology. Currently, CBCT is typically advised by an oral radiologist (for head & neck diagnosis) and by prosthodontists (for implantology). Dental implant rehabilitation is the most common rehabilitation treatment where CBCT is comprehensively used. The sole endeavour of this study was to assess the existing Knowledge and awareness regarding Cone Beam Computed Tomography among general dental practitioner in Ghaziabad, India.

Materials & Methods: The study was completely based on a cross-sectional philosophy using a questionnaire. Initially, a total of 100 private dental practitioners of Ghaziabad, India were approached and requested to fill the questionnaire. Authors employed a close-ended questionnaire having queries about the existing Knowledge and awareness about Cone Beam Computed Tomography. The questionnaire was handed over to the selected dentists at their respective workplaces. Authors processed the mined information of dentists who truthfully responded. All answers or feedbacks were gathered, and data were analyzed statistically to assess real-time Knowledge and awareness.

Results: Statistical analysis was attempted by statistical software Statistical Package for the Social Sciences (SPSS) version 21. The processed data was sent to appropriate statistical tests achieve p values, mean, standard deviation, standard error and 95% CI. $P \leq 0.05$ was set as significant. Out of 100 practitioners, males were 65, and females were 35. Total 3 participants were falling in the age range of 65 years or more. Eighteen dentists were the age range of 51-55 years. Twenty-seven participants were having an undergraduate degree and more than 5 yrs of practising experience. Seventeen participants were having the postgraduate degree and less than 5 yrs of practising experience wherein eight were having a postgraduate degree and more than 5 yrs of experience.

Conclusion: Within the limitations of the study authors concluded that Knowledge and awareness of studied dentists about Cone Beam Computed Tomography were at fair levels. Authors also anticipate periodic public awareness campaigns and didactic demonstrations about the latest radiological advancements, including CBCT.

Keywords: Cone beam computed tomography; Awareness, Implant, Surgery, Radiology.

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INTRODUCTION

As a medical professional, we all are aware that radiography is the most common diagnostic tool in routine clinical practice. Literature has shown that more than one-quarter of all medical radiographs in Europe being advised by dental professionals. After the successful discovery of x-rays in somewhere 1900, dental radiographs have been the main resource of clinical data in the head and neck region.[1,2] However; two-dimensional (2D) imaging methods are apparently incompetent to describe complex three-dimensional (3D) anatomical structures and related pathologies. Two-dimensional radiological methods have been employed in dental sciences since the first intra-oral radiograph was done in 1896. Remarkable progress in dental imaging sciences has since been noticed in the late nineties. This era is better known as the period of panoramic imaging and tomography.[3,4] Bothe of these radiological techniques enable diminished radiation exposure and rapid processing. On the other hand, the imaging science has discovered several innovative and technical facilities for better diagnostic results. Cone-beam computed tomography (CBCT) is a novel biomedical imaging technique which produces 3-D images at economical rates.[5,6] The relative radiation exposure is also low as compared with conventional computed tomography (CT). In implant dentistry, three-dimensional (3D) imaging can be done by dental cone beam computed tomography (CBCT). CBCT allows us to assess volumetric data of alveolar bone and teeth with low radiation exposure and costs.[7,8] This is the main reason why it has become extremely popular among dental clinicians and professionals. A CBCT scanner uses a collimated x-ray source that produces a cone- or pyramid-shaped beam of x radiation, which makes a single full or partial circular revolution around the patient, producing a sequence of discrete planar projection images using a digital detector.[9,10] These two-dimensional images are reformed into a three-dimensional volume that may be visualized in different ways, including cross-sectional images and volume renderings of the oral anatomy.[11-12] CBCT apparatuses were introduced commercially in the medical market of United States in 2001.[13,14] Yet, although CBCT technologies have advanced rapidly across time, concerns have been expressed about whether the information acquired with CBCT imaging warrants the additional exposure risk, as well as about the level of training, education and experience required to interpret the CBCT data set. Therefore, in light of the above intermingling facts, authors aimed to assess the existing Knowledge and awareness about this radiological aid (CBCT) among general dental practitioner in Ghaziabad, India.

MATERIALS & METHODS

This study was performed to calculate the existing Knowledge and awareness about Cone Beam Computed Tomography among general dental practitioner in Ghaziabad, India. It was solely executed on cross-sectional ideologies and philosophies. Authors explored a total of 100 private dental practitioners of Ghaziabad, India. To approach the participants, details of the general dental practitioners were received from the association of Ghaziabad dental practitioners. Initially, we noticed that there were a total 128 registered in this society. Further exploration showed that 16 dentists were not involved in private practice. So, consequently, they were 112 in hand. An additional assessment revealed that 12 of them not responded genuinely to our study. Therefore, the final sample including in the study was a total of 100 general dental practitioners. Authors have processed questionnaire response data of 100 respondents efficiently. Authors had framed the queries of CBCT knowledge and awareness in a questionnaire layout. Authors decided to keep eight queries related to CBCT in the questionnaire. A questionnaire prepared in such a way is popularly known as a close-ended questionnaire. Authors had given this printed questionnaire to the participating dentists at their clinics/workplaces. Authors have determined to perform this study on questionnaire basis because such studies are remarkably useful. They also achieve comprehensive information about individual and group opinions. Questionnaire-based studies have been successfully employed by several pioneer workers. Literature has confirmed that such studies also provide broad-spectrum information about public opinions with improved transparency and perception. Informed consent was attained from participants. To guarantee absolutely peaceful answers, the study was not performed in time-bound manner however respondents are asked to

submit the filled questionnaire within 40 days. The relative significance of this study was clarified all participants. Results were compiled in a table and subjected to basic statistical analysis. P-value less than 0.05 was considered significant (p< 0.05).

RESULTS

All data attained from questionnaire work out were subjected to statistical analysis by statistical software Statistical Package for the Social Sciences version 21 (IBM Inc., USA). The finalized data was further sent for appropriate statistical tests. These were attempted to estimate p values, mean, standard deviation, chi-square test, standard error and 95% CI. Table 1 and Graph 1 illustrated that out of 100 practitioners, males were 65, and females were 35. Total 3 participants were falling in the age range of 65 years or more. Eighteen dentists were the age range of 51-55 years. Total of 48 dentists belonged to the age range of 36-40 and 46-50 years. So, consequently, we can assume that majority of the participating dentists were in these two age groups. P-value was significant in group VIII of the age range of 61-70 years. The measured value was 0.01. Total of three dentists was in the age of >65. Seven dentists were found in the age group of 61-65. 9 participants were noted in the age group of 56-60 years. Evaluation of dentists by their educational background and practising experiences was also attempted successfully (Table 2). Forty-six participants were having an undergraduate degree and less than 5 yrs of practising experience. P-value was significant for them. Twenty-seven participants were having an undergraduate degree and more than 5 yrs of practising experience. Seventeen participants were having a postgraduate degree and less than 5 yrs of practising experience wherein 8 were having a postgraduate degree and more than 5 yrs of experience. Mean, standard deviation and p values are mentioned in the table. Only two dentists were having over and above additional degree apart from under and post-graduation. P-value was significant for them. Questionnaire workout showed in table 3. Table 4 shows a fundamental statistical description with the level of significance evaluation using the Pearson chi-square test. For question no 2, 3, 5, the p-value was found to be significant. Three-dimensional view of maxillofacial structure enables the clinician to accurately plan the site of implant placement and implant dimension (Figure 1 & 2).

Table 1: Age & gender-wise allotment of dentists.

Age Group (Yrs)	Male	Female	Total %	Mean	Standard Deviation	P value
36-40	14	10	24 [24 %]	2.09	2.93	0.01*
41-45	10	5	15 [15 %]	1.74	1.63	0.90
46-50	18	6	24 [24 %]	2.52	1.78	0.02*
51-55	11	7	18 [18 %]	2.19	1.40	0.50
56-60	5	4	9 [9 %]	1.43	1.10	0.09
61-65	5	2	7 [7 %]	0.94	0.09	0.40
>65	2	1	3 [3 %]	0.49	0.03	0.10
Total	65	35	100%	-	-	*Significant

*p<0.05 significant

Table 2: Evaluation of Dentists by Their Educational Background and Practicing Experiences.

Educational Degree	Number	Mean	Standard Deviation	P value
BDS (<5 Yrs)	46	13.98	3.98	0.01*
BDS (>5 Yrs)	27	9.48	2.74	0.20
MDS (<5 Yrs)	17	6.41	2.90	0.06
MDS (>5 Yrs)	8	2.76	1.08	0.88
MDS (>5 Yrs)+Additional Award/Degree/Diploma	2	1.58	1.01	0.02*
Total	100	-	-	-

*p<0.05 significant

Table 3: Assessment of questionnaire.

Qus. No.	Parameters
1	Do you know about rational use of CBCT in dental practice
2	Do you believe that it is only required for dental implants related cases
3	Do you believe that CBCT is a must for accurate treatment planning
4	Do you believe that current rates of CBCT must be subsidized so as to increase its judicial uses
5	Have you ever participated in any online training/face to face demonstration on implant-related radiological techniques

6	Do you think CBCT should be included in BDS final year syllabus
7	Do you think that CBCT assisted surgeries will have an excellent prognosis
8	Will you start recommending CBCT once you are thorough with it

Table 4: Fundamental statistical description with the level of significance evaluation using Pearson chi-square test.

Question No.	Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
1	2.53	0.252	0.160	1.96	2.433	1.0	0.086
2	2.76	0.264	0.000	1.96	2.242	2.0	0.020*
3	2.53	1.346	0.078	1.96	2.498	1.0	0.010*
4	2.98	0.434	0.035	1.96	1.556	1.0	0.080
5	2.23	0.276	0.025	1.96	2.550	3.0	0.001*
6	1.57	0.352	0.029	1.96	2.463	1.0	0.435
7	1.38	0.132	0.016	1.96	1.231	1.0	0.341
8	2.34	0.349	0.033	2.33	1.219	1.0	0.324

***p<0.05 significant**

Graph 1: Age & gender wise allotment of dentists.

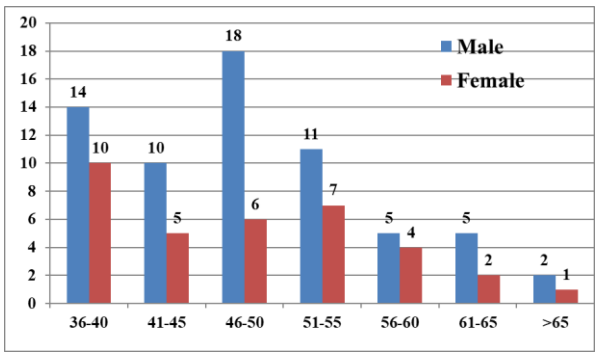


Fig 1: Three-dimensional analysis of maxillofacial structure (by cbct) enables the clinician to accurately plan the site of implant placement and implant dimension.

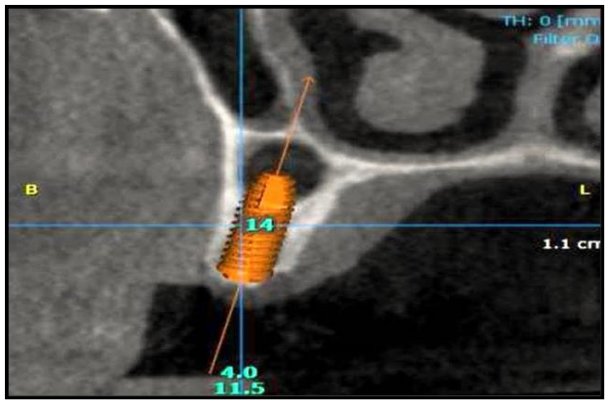
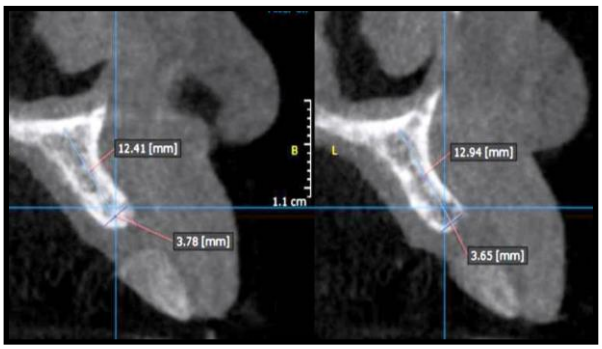


Figure 2: CBCT analysis of maxillofacial structure enables clinician to accurately plan the site of implant placement with implant dimension.



DISCUSSION

It is now a proven fact that the usage of cone-beam computed tomography (CBCT) has increased comprehensively. This expansion is more obvious in the practice of oral and maxillofacial surgeries. CBCT has been offering three-dimensional morphological details.[15,16] All such information is being used extensively in the surgeries related to esthetics and re-constructions. Furthermore, it also ensures the optimal dimensional accuracy in its depiction. Literature has shown that dental imaging is the most important and most frequently used diagnostic method.[17,18] Studies have evidenced that up to 30% of all routine radiography in Europe is advised by dental practitioners. In countries like Sweden, this proportion is reported to be up to 55%.[19-20] The relative importance of radiographic for oral diagnosis is hence proved by several pioneer workers. German dental practitioner Walkhoff had constructed the first radiographic representation of human teeth. In this third millennium, the oral and maxillofacial radiography reports are the core data source for most of the diagnostic purposes related to head and neck pathologies.[21,22] Hitherto, two-dimensional radiological methods are usually unable to comprehensively exhibit complex three-dimensional anatomical structures and interrelated dilemmas like ameloblastoma, radicular cysts, third molar impaction, apical periodontitis and many other granulomatous lesions.[23-24] In the past, the initial rebellion came with the beginning of digital dental imaging in dental sciences. As per the other available radiographic methods, CBCT technique must be employed only after health screening of the patient. It should be followed by radiation exposure

history.[25,26,27] In our study we had asked about the Knowledge of CBCT. We also enquired practitioners about their recommendation of CBCT in future. They were asked if they had ever participated in any online training/face to face demonstration on implant-related radiological techniques. Many of the studied clinicians believed that current rates of CBCT must be subsidized so as to increase its judicial. Similarly, an ample amount of the clinicians believed that CBCT is a must for accurate treatment planning, and it should be included in BDS final year syllabus. However, some other practitioners think that CBCT assisted surgeries will have an excellent prognosis. Our study aimed to evaluate the current Knowledge and awareness about Cone Beam Computed Tomography among general dental practitioner. Authors observed a few very crucial responses while executing the study.

CONCLUSION

Within the limitations of the study, the authors concluded that Knowledge and awareness of studied dentists about Cone Beam Computed Tomography were at fair levels. Because CBCT is a promising innovation in the subject of oral radiology and implantology, repeated public awareness campaigns and didactic demonstrations should be performed judiciously. Our study inferences should be considered as evocative for assuming prognosis for such crucial circumstances. However, to establish other related and advanced guidelines, the author expects genuine future researches with a larger sample size.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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