



KNOWLEDGE AND ATTITUDE OF DENTAL FRATERNITY IN JAMMU AND KASHMIR TOWARDS CONE BEAM COMPUTED TOMOGRAPHY - A QUESTIONNAIRE STUDY

Oral Medicine

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ABSTRACT

The study was conducted to gauge the knowledge of dental practitioners regarding cone beam computed tomography. The research included 110 participants, among which were graduate and postgraduate practitioners. Participants were assessed about their knowledge, attitude and practice for cone beam computed tomography through a self-administered survey form upon which the study was based. The response rate was immense and there was a voluntary participation. Results were assessed and it was concluded that still a lot needs to be done to educate dental fraternity regarding CBCT as it is one of the newer developments in modern dentistry.

KEYWORDS

Digital Radiography, Radiology, Knowledge, Cone Beam Computed Tomography

INTRODUCTION

Radiographic imaging is one of the most important tool in the diagnosis and treatment of dental and maxillofacial pathologies. In the recent past, there has been a paradigm shift from conventional to digital radiographic techniques. Anatomical restrictions in the dentomaxillofacial region limit the projection angle to certain pre-defined planes making multiple projections at different angles difficult, accurate dimensional measurement of the jawbones is not possible. Simple linear tomography is available in most panoramic machines but inferior image quality and complicated procedure have prevented it to become a popular projection.

A developing imaging modality with the advantage of rapid scan time, CBCT, is designed to produce a cone-shaped beam limited to the head and neck region. While reducing radiation doses compared with computed tomography (CT). CBCT also has an interactive display that allows imaging reformation, making it beneficial for dental practices.

Dedicated cone beam computed tomography (CBCT) scanners for the oral and maxillofacial (OMF) region were pioneered in late 1990s independently by Arai et al1 in Japan and Mozzo et al2 in Italy. Since then there has been an explosion of interest in this new imaging technique in the maxillofacial region by different research groups.

Recently, with the broad recognition of CBCT, studies have shifted towards assessing this new technology and dentists' attitudes towards it. This study was conducted to assess the knowledge and attitude of dentists in Jammu district of Jammu and Kashmir.

MATERIALS AND METHOD

A survey was conducted among dental specialists, using the following structured questionnaire:

1. Age Group

- A. 31-40 years
- B. 19-30 years

2. Level of Education

- A. Graduate
- B. Post-graduate

3. Gender

- A. Male
- B. Female

4. Span of Clinical Experience

- A. 1-10 yrs
- B. 11-20 yrs
- C. >20 yrs

5. How did you get to know about CBCT?

- A. Seminars
- B. Faculty Lessons
- C. Internet
- D. Seniors
- E. Others

6. Do you attend any workshops regarding CBCT?

- A. Yes
- B. No

7. Please number the following advantages of CBCT over medical CT from most important (1) to least important(6):

- A. Lower radiation dose
- B. Shorter scanning time
- C. Less expensive
- D. Occupies less space
- E. Easier to maintain
- F. Image processing is easier due to the limited beam

8. CBCT offers enhanced diagnosis at lower dose than CT?

- A. Yes
- B. No
- C. No idea

9. The radiation dose and risk from CBCT is generally higher than the conventional dental radiography (IOPA, panoramic etc) but lower than conventional CT scans

- A. Yes
- B. No
- C. No idea

10. Have you ever referred your patients for CBCT imaging?

- A. Yes
- B. No

11. What do you think is the cost of CBCT for one image?

- A. Below 2000 INR
- B. Between 2000-5000 INR

- C. Above 5000 INR
- D. No idea

12. For what cases would you choose to use CBCT?

- A. Implant dentistry
- B. Extraction of impacted teeth
- C. Evaluation of patients with tumour or cysts
- D. Orthodontic assessment
- E. All the above
- F. Other
- G. No need

13. To what extent do you think CBCT will be used in routine dental practice in near future?

- A. In all areas of dentistry
- B. For selected dental applications which ones?
- C. It will not be commonly used in routine practice
- D. No idea

14. Do you think it is necessary for a CBCT unit to be available at your speciality?

- A. Yes
- B. No
- C. No idea

15. Which year of dental education should include lectures on CBCT?

- A. Preclinical phase
- B. Clinical phase
- C. Doctoral phase
- D. There is no need

16. Are you satisfied with the use of CBCT?

- A. Yes
- B. No

A total of 145 dental practitioners were invited to participate in the study, of which 110 gave their consent to participate. Out of the 110 participants, 71 had BDS degree and 39 were Postgraduates (MDS). Among postgraduate practitioners, 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.

RESULTS

Of all participants, 62 (56.4%) were males and 48 (43.6%) were females. Out of 110 participants, 83 (75.5%) were aware of CBCT and the most common source of information about CBCT was faculty's lessons followed by Seminars. Of these, more than half of Post Graduate Practitioners (71%) had learned about CBCT in seminars, whereas the majority of Graduate Practitioners (87%) had learned about the same in faculty lessons. In addition, 17.3% of all participants had learned about CBCT from the internet. Other sources of information included friends and journals (5.4%).

About 69% of practitioners had attended courses on CBCT. Of these 62% were postgraduates whereas remaining 31% were graduates.

Overall, low radiation dose was given as the most important advantage of CBCT (64.5%) and easier maintenance as the least important advantage (15.5%).

About 59% of practitioners had referred their patients for CBCT. Of these 62% were postgraduates whereas remaining 31% were graduates.

About (44.5%) PG Practitioners believed CBCT should be used in all types of dental procedures, compared to only 22.7% graduates. The most frequently cited indication for CBCT was implant applications (60%), followed by tumour/cyst cases (31.8%).

The majority of practitioners (56.4%) were of the opinion that information on CBCT should be included in clinical lectures (years 4-5), whereas acc to 9% it should be included in pre-clinical lectures (years 1-3). Whereas about 33.6% were of the opinion that it should be included in doctorate (postgraduate) lectures. Very few (0.9%) felt no need for CBCT education. The majority of participants (74.5%) wanted a CBCT unit at their faculty.

The majority of participants (61.8%) stated that they would use CBCT when treating patients during their future professional careers, only 9% did not expect to use CBCT and 29% did not know if they would use CBCT. This can be attributed to the fact that CBCT is a recent advancement in the field of oral radiology. When participants were asked about the advantages of CBCT over other imaging modalities, 44.7% mentioned lower radiation but 16.7% had no idea. About 94% of practitioners were satisfied with the use of CBCT.

DISCUSSION

Cone beam Computed Tomography (CBCT) has recently become very useful for oro-facial and dental imaging. When compared with conventional CT scan, CBCT requires less space, has rapid scanning time, and beam is limited to the required area with less radiation doses^{3,4}. Disadvantages include: beam hardening, scatter from dental materials and poor soft-tissue contrast⁴. Digital radiography is potentially an area where exposure to large amount of radiation may be avoided owing to sensitivity of the image receptor and ability to manipulate the image to optimally display the subject of interest⁷. Most of the dentists (64.5%) in our study are in agreement with this when it comes to CBCT. In a study conducted by Brain et al, the highly rated asset for using digital radiography was saving time (87%)⁶. Berkhout and Williamson reported that the total number of radiographs taken by general dental practitioners using digital radiography was significantly higher than the number of radiographs taken by film users. The need for more certainty about the planned or ongoing treatment as well as better diagnosis was the most important reason for taking more radiographs. 75.5% dentists had general knowledge about cone beam computed tomography (CBCT).

CBCT awareness among dentists was relatively low in graduates as compared to post graduates. The lack of a CBCT unit at UG educational institution seems to have played a significant role in student's unfamiliarity with this technology. 74.5% dentists were willing to have a CBCT unit in their dental institution. About 26.7% practitioners obtained information regarding CBCT through seminars. 69% had already attended courses related to CBCT imaging. But only 59% of dentists had referred their patients for CBCT imaging. Most of the dentists preferred CBCT referrals for dental implant planning (60%), tumors and cyst (31.8%), endodontic treatment (4.3%), orthodontic assessment (3.1%) and impacted tooth (0.8%). Researches show that CBT is used in the treatment of dental implants, particularly in linear dimension, three dimensional structures of alveolar ridge, design for surgical guide and vicinity to vital anatomical structures⁷. CBCT is used in Implantology as well in a wide variety of assessments before the treatment, such as anatomical distinction, and evaluations associated with complications following surgery with an emphasis on the damage to neurovascular structure⁵. A study showed the essentiality of tomographies in diagnosing vertical root fractures⁹. Balabaskaran¹⁰ found that some dentists are not aware of cone beam computed tomography used for maxillofacial region. Although periapical are preferred to panoramic radiographs, but the limitations of periapical radiographs may hinder the detection of periapical lesions and more roots need to be assessed, and secondly, more periapical lesions need to be detected with CBCT.

Patel et al.¹¹ shows a 14 times increase in failure rate when teeth with no pre-operative periapical radiolucencies were assessed with CBCT compared with periapical radiographs at 1 year. Pecker et al.¹² and Ishak¹³ highlighted the significance of CBCT in the field of surgical exodontia.

Chau et al compared typical patient radiation doses delivered in implant. imaging with spiral CT, conventional spiral tomography and CBCT in their study. They reported that CBCT delivers the lowest radiation dose to the organs, whereas spiral multi-slice CT delivers the highest dose¹⁴. CBCT awareness in general is relatively new and theoretical lessons on CBCT have recently been included in dental school curriculum. 65.4% practitioners were of the opinion that the lectures regarding CBCT should be included in clinical phase of dental education. It is not surprising that CBCT education remains limited to theoretical instructions in most parts of India as very few CBCT units are available all over the country. Interestingly most of the dentists 61.8% were willing to use CBCT in their future dental career.

Radiation safety is an important issue in dental radiography. The dose per exposure is generally lower in digital radiography than the conventional radiography. The literature has described in vitro digital

dose reduction of 50-94%, when compared with Ektaspeed film (Eastman Kodak, Rochester, NY)¹⁵. The radiation dose of CBCT is much less when compared to conventional CT. CBCT being a most recent imaging modality, practical knowledge regarding the usage of this unit was lacking among most of the dentists. The dentist's responses in our study clearly indicated, that education regarding digital radiography and advanced imaging modalities like CBCT must be provided to the present day dental fraternity for a better dentistry owing to its advantages over the conventional radiography.

Shetty et al.¹⁶ evidence the importance of CBCT in dentistry and proved that the imaging quality and details of tomographies is better than intra oral periapical or orthopantomogram whereas due to cost effectiveness of conventional dental radiography, the use of CT and CBCT scan has been subsided.

CBCT is a new advancement in radiology in hospital setup and therefore, there is great lack of theoretical as well as practical lessons according to this research. Considering the fact that there is a great lack of CBCT units in the hospital setup, therefore CBCT education is chiefly restricted to textbooks. Our study highlights the difficulties of acquiring knowledge about a system without practical experience. The lack of a CBCT units at all three institutions seems to have played a significant role in student's unfamiliarity with this technology. As student responses, theoretical education must be supplemented by routine practice with CBCT.

Thus, study focused that there should be lectures, seminars, conferences and education programs regarding the importance of CT and CBCT for patient care and applying conservative dental procedures. The more the disease is viewed radiographically with good imaging details, the more the conservative dentistry grows leading to best patient care within short time. The curriculum of basic dental qualification program should set including brief knowledge about radiology by which treatment plan could not be established. The students should made friendly with different imaging techniques during their undergraduate level so that they may come up with better diagnosis and treatment plan for a patient.

CONCLUSION

This study throws some light on the awareness and attitude of dentists towards cone beam computed beam tomography. CBCT is one of the most remarkable new developments in dentistry. The limited use of CBCT could be attributed to CBCT units' unavailability at institutions and insufficient undergraduate teaching. Our recommendations are to increase the number of continued education programs, modification of dental radiology curricula to include more details regarding CBCT and to include CBCT units in each institution.

CBCT is one of the most significant new developments in modern dentistry. It possesses many advantages over CT, including much lower doses of radiation. This high-quality imaging technology should be adopted by dentists, and dental students should be provided with appropriate education supported by practical experience. Educational courses, meetings and seminars about oral and maxillofacial radiology must be held to update dentist's knowledge of the imaging systems. Owing to the vast usage of CBCT in various fields of dentistry, there is a need for well-guided and well-planned teaching programs for the present day dental fraternity.

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