

Knowledge of correct prescription of the radiographs among specialist and general practitioner dentists in specialized health centers of dentistry in Mosul city

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ABSTRACT

Background: Radiograph and other imaging modalities are used to diagnose and monitor oral diseases, as well as to monitor dentofacial development and the progress or prognosis of therapy. Radiographic examinations can be performed using digital imaging or conventional films. Digital imaging may offer reduced radiation exposure and the advantage of image analysis that may enhance sensitivity and reduce error introduced by subjective analysis. In addition, new imaging technology offers the possibility of three dimensional visualization of skeletal and other structures. The use of x-rays for diagnosis and treatment in dentistry is increasing, so dentists must have adequate knowledge and awareness about correct prescription of the radiographs and the principles of protection against side effects of radiation.

Aim of study: The aim of this study is to evaluate the awareness and knowledge of specialist and general practitioner dentists about correct prescription of the radiographs in specialized health centers of dentistry in Mosul city.

Materials and methods: This was a descriptive cross-sectional study including 100 specialists and general practitioner dentists, a self-administered questionnaire was used to assess their level of knowledge in various sections and about cone beam computed tomography (CBCT) imaging modality pertaining to correct prescription of dental radiographs based on previously validated and reliable questionnaire and to American Dental Association guide lines.

Results: According to the results obtained, dental specialists showed higher percentage of knowledge and awareness about radiographs than general practitioner, males who participated in the questionnaire were answered better than females. Regarding CBCT questions, also males were answered better than females. There was no relationship has been found between age and knowledge about CBCT.

Conclusion: The level of knowledge among participants was lower than expected, this could be due to various factors such as lack of previous knowledge, inadequate quality and quantity of educational courses and may be due to inadequate clinical dental work, regarding CBCT imaging, inadequate knowledge among participants may be due to this is new imaging modality, and may be due to unavailability of these units in their dental offices. Thus, dentists should receive necessary education and increase their clinical work to ensure their correct prescription of radiographs, circumventing unnecessary exposure to x-rays.

Key words: Knowledge, cross sectional study, dental education, radiograph prescription, radiation risks.

INTRODUCTION

Radiography being a traditional part of dentistry has been considered as one of the appropriate methods of obtaining information about the tooth anatomy and its surrounding hard tissues. Thus radiographs were considered as third eye to the dentist.⁽¹⁾

Since the discovery of x-rays in 1845, the field of imaging has evolved from the two-dimensional imaging modalities to the current advanced modalities including three-dimensional imaging enabling superior treatment options and virtual surgeries.⁽²⁾ The quality of imaging has not only improved the diagnostic accuracy of diseases but the quality care regard to patient exposure and time consumption.^(3,4)

Decision for obtaining radiographic images depends on patients history and clinical findings, in many cases it is not clear whether to go to the radiological choice or not, in 1980, American Dental Association (ADA) designed a guide lines for prescription of dental radiographs, which was updated by Food and Drug Administration (FDA) in 2004.⁽⁵⁾

While the use of x-rays is increased in the medical diagnosis, the principles of protection against side effects of radiation need special consideration.⁽⁶⁾

Cone beam computed tomography (CBCT) is a medical imaging technique consisting of x-ray computed tomography where the x-rays are divergent, forming a cone with cone beam CT, an x-ray beam in the shape of a cone is moved around the patient to produce large number of images in the form of views or slices.^(7,8) CBCT produces high quality images and it has the ability to give sub-millimeter resolution in terms of images with high diagnostic quality.⁽⁹⁾

MATERIALS AND METHOD

This was a descriptive cross-sectional study including 100 dentists of Mosul city, (50 specialists and 50 general practitioners). A structured, close ended, self-designed questionnaire containing of 10 questions was given to the participants in their offices, based on previously validated and reliable questionnaire and on the American Dental Association (ADA) guidelines for prescription of dental radiographs, which was updated by the Food and Drug Administration (FDA) in 2015⁽¹⁰⁾, and on a similar study conducted in Belagavi city. The participants were answered to each questions according to their knowledge by yes or no. data entry was done on Excel sheet and analyzed using Statistical Package for the Social Software (SPSS) version 19. Each correct answer received one point and each incorrect answer received nil point. The sum of these points made up the score out of 10 which denoted the level of knowledge of each respondent. The nominal levels of knowledge were assigned as: good = more than 60% correct answers, moderate = between 50% and 60% correct answers, and poor less than 50% correct answers.

RESULTS

All 100 respondents were answered the 10 questions in the questionnaire. Regarding to the specialist dentists, 50% of them have good answers, and 30% have moderate answers, and 20% of them showed poor answers, but regarding general practitioners 30% of them have good answers, and 40% of them have moderate answers and 30% of them showed poor answers. (Table 1 and 2).

Table (1): The results of participants to the questionnaire in 100 % (specialist dentists)

No.	Paragraph	correct	100% Percent	In correct	100% Percent
1	Are you know ALARA principles of radiation protection?	27	54	23	46
2	Are dental radiograph absolutely contra indicated in pregnant women?	41	82	9	18
3	OPG. radiographic technique is preferred for assessment of impacted lower third molar	46	92	4	8
4	Detection of soft tissue components of TMJ is by MRI imaging modality.	44	88	6	12
5	One disadvantage of CBCT is limited contrast resolution.	20	40	30	60
6	Are you prefer CBCT for diagnosis of vertical tooth fracture?	20	40	30	60
7	Are you prefer CBCT for diagnosis of maxillary sinus pathology?	31	62	19	38
8	Are all CBCT unites have the same radiation dose?	27	54	23	46
9	The risk of CBCT radiation to the child is twice that to the adult.	41	82	9	18
10	Bitewing radiograph is the best choice for detection of dental caries	45	90	5	10

Table (2): The results of general practitioners to the questionnaire in 100%

No.	Paragraph	correct	Percent %	In correct	Percent %
1	Are you know ALARA principles of radiation protection?	11	22	39	78
2	Are dental radiograph absolutely contra indicated in pregnant women?	31	62	19	38
3	OPG radiographic technique is preferred for assessment of impacted lower third molar	41	82	9	18
4	Detection of soft tissue components of TMJ is by MRI imaging modality.	43	86	7	14
5	One disadvantage of CBCT is limited contrast resolution.	17	34	33	66
6	Are you prefer CBCT for diagnosis of vertical tooth fracture?	21	42	29	58
7	Are you prefer CBCT for diagnosis of maxillary sinus pathology?	32	64	18	36
8	Are all CBCT unites have the same radiation dose?	25	50	25	50
9	The risk of CBCT radiation to the child is twice that to the adult.	25	50	25	50
10	Bitewing radiograph is the best choice for detection of dental caries	46	92	4	8

According to the gender, the percentage of correct answers among females to the questionnaire were 54.3%, and among male were 58.6%. The percentage of correct answers regarding to CBCT among male and female were 76.4% and 62.3% respectively.

Regarding to the years of dental experience, dentists who have less than 10 years of dental work were have 58.3% of knowledge, and those of between 10-20 years' work showed 63.2% of awareness and dentists who are more than 20 years of dental work were have 71.8% of knowledge and awareness about prescription of radiographs.

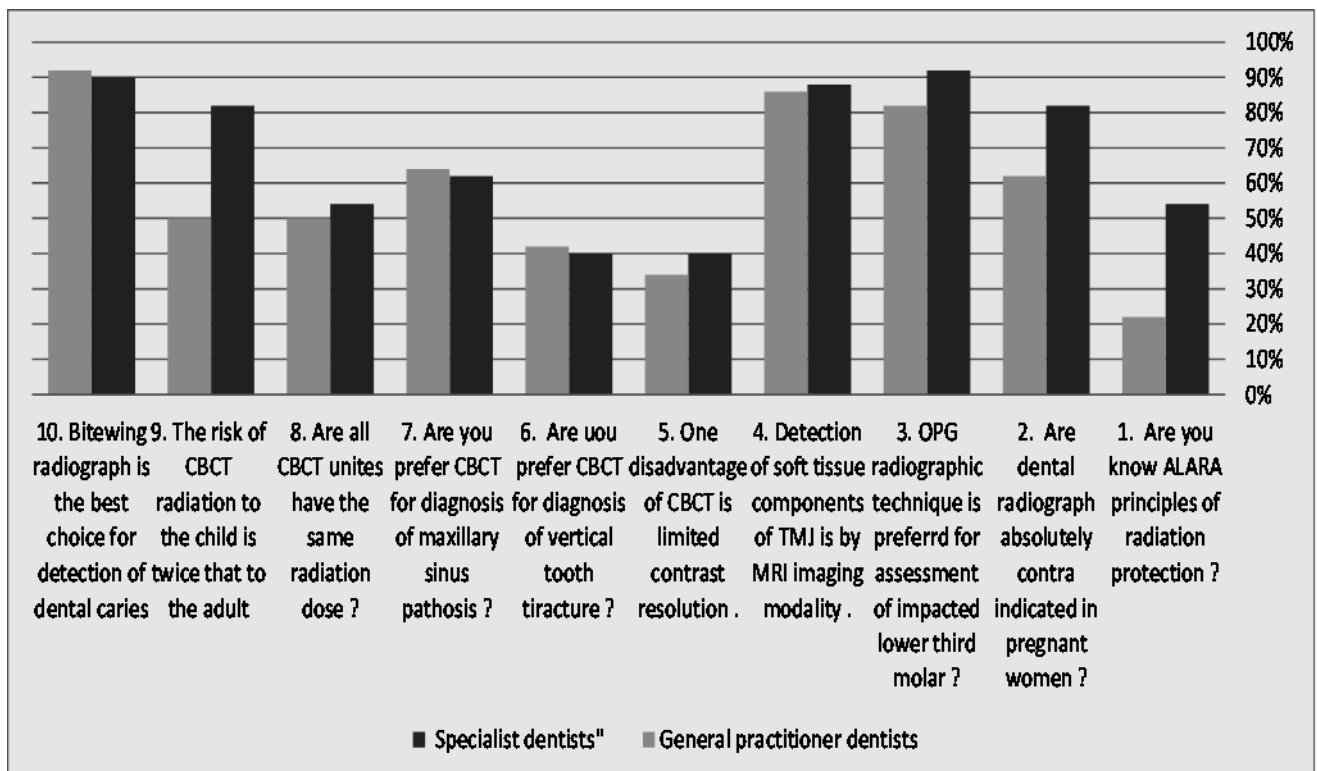


Figure (1): The level of knowledge of participants in percentage 100%

DISCUSSION

Ezoddini AF, Sarayesh (2007) has been concluded that specialist dentists were more knowledgeable than general practitioner dentists about prescribing radio graphical examinations according to study conducted in Yazd, Iran to assess the level of knowledge about correct prescription of radiographs among specialist and general dentists.⁽⁶⁾

A questionnaire cross sectional study on application of cone beam computed tomography (CBCT) in Dental Postgraduate Students in Belagavi city, most of the respondents showed in adequate knowledge about CBCT. Hence, there is an urgent need for more training programs on CBCT which would result in better diagnosis and treatment planning.⁽¹¹⁾

The aim of this study is to assess the level of knowledge of correct prescription of radiographs among specialists and general practitioner dentists in specialized health centers of dentistry in Mosul city.

X-radiation is potentially damaging to the humans, this damage may not be manifested up to 10-20 years, which is called latent period of radiation injury, free radicals produced through interaction with water molecules cause cell damaging, so unnecessary exposure to radiation should be avoided as much as possible and it is mandatory for dentists and health care professionals to have basic knowledge about x-rays.⁽¹²⁾ (Figure 1) explain the level of knowledge of specialist and general practitioner dentists about prescription of radiographs.

Ionizing radiation is the subject of considerable safety legislation designed to minimize the risks to radiation workers and to the patients, so the International Commission on Radiological Protection (ICRP) regularly publishes data and general recommendations, one of these recommendations is that x-rays must be kept as low as reasonably acceptable (ALARA), taking economic and social factors information.⁽¹³⁾ In this study, only (54%) of specialists and (22%) of general practitioner have knowledge regarding to ALARA principles.

The results of several studies suggest that if a response to diagnostic radiation during late second semester, the main problem will be malignant disease during childhood,⁽¹⁴⁾ such a response to radiation during pregnancy is the result of a very high dose. It is estimated that there is a one-percent increase in congenital abnormalities subsequent to an exposure of 10 rad (100 milligray) of fetal dose. Since diagnostic doses are less than 10 rad in dentistry, such abnormalities cannot be attributed to dental diagnostic doses.^(15,16) Kusama et al (2002) indicated that the fetus does not directly receive radiation dose during head and chest diagnostic exposures and that the absorbed dose was estimated at less than 0.01 milligray. It was concluded that in women who were unaware of their pregnancy and who had been exposed to radiation, there is no need for pregnancy termination when the exposure dose to the fetus is less than 100 milligray.⁽¹⁷⁾

The National Council on Radiation Protection has stated that the risk of malformations for exposure up to 5 rad is insignificant if compared to other pregnancy risks.⁽¹⁸⁾ In this study, 82% of specialists and (62%) of general practitioners said that there is no absolute contra indication of dental radiographs in pregnancy, indicating good knowledge.

The routine dental x-rays presently available are two dimensional and the mandible being of unique shape and design may mislead the radiologist as well as the surgeon in planning the surgery.⁽¹⁹⁾ The third molar usually has a large crown with more than two roots. Some part of the tooth structure and the roots get blocked by the bony mass of the mandible allowing only the lateral/labial or the medial/buccal surface to be visible in the radiographic view, which in addition may be complete or incomplete, this radiographic view may mislead the surgeon contributing to incorrect pre-operative assessment and possible intra-operative and post-operative complications. Orthopantomogram (OPG) and intra oral peri-apical x-rays taken from two different planes give a more complete view of the tooth to be extracted. We rely on the orthopantomogram which is expected to have 20% magnification and exposes labial /lateral bone cover of the tooth and also shows the total bone length and breadth.^(19,20) In this study, 92% of specialists and 82% of general practitioners were preferred (OPG) for assessment of lower 3rd molar teeth, indicating moderate knowledge.

Magnetic Resonance Imaging (MRI) should be part of the standard evaluation when an internal structural abnormality of the temporomandibular joint (TMJ) is suspected because MRI provides high resolution and great tissue contrast. This allows for a detailed evaluation of the anatomy of the joint through open and close mouth imaging.⁽²¹⁾ About 88% of specialists and 86% of general practitioners were agreed with this technique. Cone Beam Computed Tomography as any technology, has disadvantages, one major disadvantage is it can only demonstrate limited contrast resolution, mainly due to relatively high scatter radiation during image acquisition and inherent flat panel detector related artifacts. Among all respondents who questioned one disadvantage of CBCT is limited contrast resolution, only 40% of specialists and 34% of general practitioners were answered correctly about this question. The risk of adult patient fatal malignancy related to CBCT is between 1/100,000 and 1/350,000 and when using the technology for children, the risk could be twice as much.⁽⁷⁾ The question about risk of CBCT radiation to the children and adults, 82% of specialists and only 50% of general practitioner were have good awareness about the radiation risk of CBCT. Regarding the question of are you prefer CBCT for diagnosis of vertical tooth fracture, 40% of specialists and 42% of general practitioners were preferred CBCT. 62% of specialists and 64% of general practitioners were preferred CBCT for diagnosis and assessment of maxillary sinus pathologies.

CBCT is a low dose scanning system, which has been specifically designed to produce three-dimensional images of the maxillofacial skeleton.^(22,23) It is indicated for diagnosis and treatment plan, nerve tracing in case of third molar extraction; in sinus pathologies, detecting vertical root fracture, and in TMJ disorders.^(24,25)

In this study it found that most of the respondents were unsure about CBCT radiation exposure when compared with other imaging modalities, a majority of the respondents did not have any idea on images characteristics of CBCT which could be attributed to the lack of practical experience and unfamiliarity with image acquisition. Among all participants only 54% of specialists and 50% of general practitioners answered correctly about the question are all CBCT units have the same radiation dose? A review of literature suggested that not all CBCT units produce the same dose of radiation. The effective radiation dose is dependent on the field of view (focused or large) and rotation around the head (180° or 360°).⁽²⁶⁾

CBCT scanner can be very helpful in educational institutions for practical training purposes. A similar study conducted by Shishir Ram Shetty et al; (2015) among dentists in Mangalore found a 100% necessity of having CBCT scanner in dental institution.⁽²⁷⁾

Food and Drug Administration guidelines suggest bitewing radiography is the best method for detecting proximal lesions.⁽²⁸⁾ In a study conducted by Akarslan et al (2008) showed the highest diagnostic accuracy with bitewing, followed by the periapical and panoramic images⁽²⁹⁾. Another study by Kamburoğlu et al (2012) on proximal caries detection accuracy using bitewing and panoramic radiography revealed bitewing radiography was superior to panoramic radiography⁽³⁰⁾. In the current study, 90% of specialists and 92% of general practitioners chose bitewing, indicating good knowledge in this area.

CONCLUSION

The results of this study indicated that there was a gap in the knowledge regarding As Low As Reasonably Acceptable principles of radiation protection, there was inadequate knowledge about CBCT applications specially among general practitioner dentists as it is a new innovation in the field of dental radiology. It is recommended that dentists must receive a necessary education about radiation risk and protection for appropriate prescription of radiographs. Introduction of training in CBCT at undergraduate as well as postgraduate level in using this technique is an efficient way to upgrade the accuracy and reliability of oral and maxillofacial diagnosis and treatment planning.

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