

Knowledge of Correct Prescription of Radiographs among Dentists in Yazd, Iran

Fatemeh Ezoddini Ardakani^{1*} Vahid Sarayesh²

¹Assistant Professor, Department of Oral and Maxillofacial Radiology, Faculty of Dentistry, Yazd University of Medical Sciences, Yazd, Iran

²Dentist, Private Practice, Yazd, Iran

*Corresponding Author; E-mail: ezoddini@gmail.com

Abstract

Background and aims. While the use of X-ray is increasing, professional responsibility of dentists entitles them to have sufficient and correct knowledge of using radiographs. The aim of this study was to assess the level of knowledge of correct prescription of radiographs among dentists in Yazd, Iran.

Materials and methods. This was a descriptive cross-sectional study including 134 general dentists and dental specialists. A self-administered questionnaire was used to assess their level of knowledge in various sections pertaining to prescription of radiographs. Their level of knowledge was compared in each section on the basis of gender and educational status.

Results. Participants showed a high level of awareness in prescription of panoramic, periapical radiographs, and computerized tomography, whereas it was moderate in the field of occlusal radiographs, susceptible patients to caries, patients with periodontal diseases, evaluation of growth condition and dental crypts and weak in the fields of bitewing radiographs and unsusceptible patients to caries. There was no difference in level of knowledge between genders. The level of knowledge in specialists was higher than general dentists except for using X-ray for susceptible patients to caries where no significant difference was observed.

Conclusion. Specialist dentists were more knowledgeable than general dentists in prescribing radiological examinations.

Key words: Dental radiography, knowledge, maxillofacial radiography.

Introduction

In medical sciences, treatment is based on the grounds of a correct diagnosis which is not possible to achieve with clinical examination alone. One important paraclinical diagnostic approach is to use radiographs. Information obtained from radiographs can be very useful in diagnosis, but exposing the patient to radiation may lead to irreversible side effects such as malfunctions in cellular pathways (like metabolism, growth, and cellular division) and/or genetic changes. Risks of low dose X-ray exposure include carcinomas, mutations and inborn growth defects.¹ While the use of X-rays in diagnosis is increasing, the principles of protection against side effects of radiation need special consideration. One effective way in decreasing possible risks of X-rays is to avoid their application when it is not essential.²

Decision for obtaining radiographic images de-

pends on clinical findings and history. However, in many cases, it is not obvious whether to choose a radiological approach or not. In 1980, American Dental Association (ADA) designed a guideline for prescription of dental radiographs, which was updated by Food and Drug Administration (FDA) and ADA in 2004.³ This chart helps the dentists prescribe radiographs correctly for new patients or those referring again based the age of the patient, medical and dental history, and physical signs and symptoms. According to the guidelines, a dentist can expose patients to radiation whenever there are convincing reasons for its application. One study compared the diagnostic values of bitewing radiographs for dental caries with other diagnostic techniques and concluded bitewing radiograph is a better approach for diagnosing dental caries compared to other techniques.⁴ Another study

evaluated the efficacy of implementing FDA guidelines for prescription of dental radiographs and concluded that developing an algorithm or set of decision rules reduced total number of radiographs by 36%.⁵ Assessing the usage of panoramic radiographs, it was shown that it had limitations in comparison to the intra-oral techniques for diagnosis of dental caries and periodontal diseases.⁶ A study evaluating the Norwegian dental standards for selection of digital radiographs showed acquaintance rate and working with computers were the most important factors in selection of digital radiographs.⁷

The aims of the present study were to assess the knowledge of correct prescription of radiographs among dentists in Yazd, Iran, and to compare their practices with FDA guidelines.

Materials and Methods

In this descriptive cross-sectional study, 134 dentists (120 general dentists, male: 80 and female: 40; 14 dental specialists, male: 11 and female: 3) were included. A questionnaire including 20 multiple choices validated and reliable questions were given to the respondents in their offices and collected after 2 weeks. The level of knowledge was evaluated in various sections according to the FDA guidelines, namely correct prescription of panoramic, periapical, bitewing, and occlusal radiographs, computerized tomography, appropriate radiographs for susceptible patients or insusceptible to tooth caries, periodontal diseases and growth condition of the teeth.³ The level of knowledge in each section was evaluated according to gender and educational status, i.e. general dentist or specialist.

Each correct answer received 1 point and each incorrect answer received nil. The sum of these points made up the score for level of knowledge for each respondent. Separate scores were also calculated for each ten sections evaluated. The

nominal levels of knowledge were assigned as follow: Good: more than 50% correct answers; Moderate: exactly 50% correct answers; and Poor: less than 50% correct answers.

The census sampling was used for recruiting the subjects, which included all the general and specialist dentists in the province of Yazd, Iran. Data were assessed by descriptive statistics. Differences and associations were analyzed using *t*-test and one-way analysis of variance. In statistical analyses, P value < 0.05 was considered as significant.

Results

The level of knowledge of the all subjects regarding panoramic and periapical radiographs, and computerized tomography were good. Their level of knowledge in sections including taking of radiographs in susceptible patients to tooth caries, occlusal radiographs, periodontal disease and the evaluation of growth condition of teeth was moderate, while the scores of sections on bitewing radiographs and insusceptible patients to tooth caries was found to be poor (Table 1).

In pediatric periodontal diseases, 38% of dentists believed that bitewing and periapical radiographs were useful, 1.5% of them believed that panoramic radiographs were useful, while 60% believed radiographs were not effective in periodontal diseases.

The results showed that there were no significant associations between the mean level of knowledge and gender in any sections ($P = 0.774$). There were significant differences in the mean level of knowledge between general dentists and specialists regarding correct prescription of panoramic ($P = 0.0001$), periapical ($P = 0.0001$), bitewing ($P = 0.0001$), and occlusal radiographs ($P = 0.0001$) as well as evaluation of growth condition of dental buds ($P = 0.0001$) and for patients insusceptible to tooth caries ($P = 0.0001$).

Table 1. Mean score of level of knowledge among respondents in each field of prescription of radiographs

Prescription	Level of knowledge		
	Good	Moderate	Poor
Panoramic radiograph	67.2	22.4	10.4
Bitewing radiograph	14.2	39.5	46.3
Periapical radiograph	51.5	46.3	2.2
Occlusal radiograph	31.3	59.7	9.0
Radiographs for susceptible patients to tooth caries	30.6	38.8	30.6
Radiographs for insusceptible patients to tooth caries	22.4	32.1	45.5
Radiographs for patients with periodontal disease	25.4	42.5	32.1
Radiographs for evaluation of growth condition	28.4	59.7	11.9
Computerized Tomography (CT)	58.2	28.4	13.4

Discussion

In this study, the level of knowledge of dentists regarding the prescription of various radiographs was studied and compared on the basis of gender and educational status (general dentists versus specialists). The mean score of knowledge of general dentists was 14.58, compared with 18.93 of specialists. There was a statistically significant difference between knowledge score and education status between general and specialist dentists.

In one study, it has been shown that usage of an algorithm for prescription of radiographs resulted in 36% reduction in the number of radiographs.⁵ In another study, usage of bitewing radiography for diagnosis of tooth caries was compared with other methods and was concluded that the other methods including transillumination were not as efficient as bitewing radiographs.⁴ Callaghan & Crocker⁸ developed guidelines for using of bitewing radiograph for detection of dental caries, considering its potential risk factors. In our study, it is inferred that the awareness level of dentists for correct prescription of radiographs is lower than expected. This low level could be due to various factors such as a lack of previous knowledge, or inadequate quality and quantity of educational courses in the university or in continuing education courses.

Rushton et al⁶ concluded that panoramic radiograph was not an appropriate approach for diagnosis of tooth caries and periodontal problems in large number of patients, while bitewing and periapical radiographs were more suitable. In their study, 94% of the dentists answered correctly to this question that reason could be the increasing usage of this technique by dentists, especially among specialists. Keur⁹ concluded although panoramic radiographs in toothless patients could be carcinogenic, it was recommended in these patients because of its benefits. In our study, 91% of the dentists answered correctly to questions on prescription of panoramic radiographs which indicated a good level of knowledge in this field. In addition, White¹⁰ reported the effective radiation dosage in panoramic radiography is 10% less than intraoral radiographs. In our study regarding the latter issue, the level of knowledge of respondents was considered good.

Akerblom et al¹¹ concluded the vertical bitewing radiography of all regions of the oral cavity is necessary for revealing periapical lesions. In the present study, 60% of dentists agreed, while 30% disagreed to use of vertical bitewing radiography.

Atchison et al¹² have studied the FDA guidelines for prescription of radiographs and concluded using FDA standards could reduce patients radiation exposure without affecting treatment. The

results of the present study showed that only 36% of participants were aware of this fact probably because general dentists take less advantage of various radiology techniques than specialists. In our study, 58% of dentists answered the related question correctly. In addition, the knowledge of computerized tomography (CT) was relatively good which shows an interest towards this technique among the dentists.

In the case of children with periodontal disease, specialists were more aware of correct prescription of radiographs than general dentists. The reason for this difference may be that general dentists usually do not treat these patients and most of them are referred to specialists.⁴ Molander¹³ showed intraoral radiographs such as bitewing and periapical are the first choice when a specific restricted area needs to be studied and according to this author's, 50% of participants agreed to this.

The obtained results in the section regarding diagnosis of susceptible and insusceptible patients to tooth caries could be due to the fact that radiographic examination is not used routinely in the diagnosis of tooth caries and there is no need to expose unsuspected cases to radiation in order to diagnosis tooth caries. ADA recommends using of FDA guidelines for prescription of radiographs and various studies suggesting the benefits of these guidelines have been undertaken. In a study of 490 patients conducted by White et al,¹⁴ radiographs were prescribed according to FDA guidelines which resulted in 43% reduction to exposure. It was concluded that dentists can use these guidelines to decrease radiation exposure without affecting treatment.

According to our results, there was a significant association between level of knowledge of dentists and their educational status. Evaluation of growth condition and teething is done by all dentists and it is not referred to specialists. With respect to the obtained results, the knowledge of correct prescription of radiographs among dentists in Yazd, Iran, is not at a desired level, especially in the areas pertaining to evaluation of tooth caries, periodontal diseases, condition of growth, and teething during different periods according to the FDA guidelines. It is recommended that dentists receive the necessary education on use of these guidelines.

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