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ORAL X-RAY SAFETY STANDARDS ADOPTED BY GENERAL DENTISTS PRACTICING IN THE NATIONAL CAPITAL REGION (NCR)

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ABSTRACT

Introduction: With the advancement of diagnostic techniques, the use of radiological examination has increased many times over the past two decades. Ionizing radiation from radiographic examination carries the potential to cause harm by generating carcinogens in addition to the extracted diagnostic information. The dose of radiation used during dental treatment can be low for individual visits, but patients often have multiple follow-up visits and many are exposed during dental treatment. Therefore, radiation protection and safety guidelines should be followed by dentists to ensure minimal and unavoidable exposure. **Purpose:** The aim of this study was to examine the knowledge and behavior of general dentists practicing in the National Capital Region (NCR) regarding radiation protection during radiographic procedures oral teeth. **Materials and methods:** This study was a cross-sectional study based on a questionnaire. A total of 500 general dentists were contacted to participate in the study. The target population includes general dentists practicing in the National Capital Region. Data were calculated and tabulated in Microsoft Excel tables and statistical analysis was performed using SPSS version 21.0. **Results:** The total recovered response rate was 70.6% and respondents were 59% and 41% male and female respectively. Only 64.8% of general dentists consider the thyroid the most important organ for radiation protection. New 28.8% of general dentists follow the rules of position and spacing reasonably. **Conclusion:** The results show that the knowledge and behavior of general dentists and the practices adopted by them in terms of radiation protection are inadequate. To ensure compliance with the basic and necessary guidelines on radiation protection and radiation protection, state boards need to implement strict rules with sanctions and apply educational methods. Exciting new education for the spectrum of the field.

KEYWORDS: The target population includes general dentists practicing in the National Capital Region.

INTRODUCTION

According to UNSCEAR (United Nations Scientific Committee on the Effects of Atomic Radiation), as reported in 2008, approximately 480 million diagnostic x-ray examinations in dentistry are performed annually worldwide. world and these dental x-ray examinations account for 15% of all diagnostic x-ray examinations. medical examination and treatment.[1] In addition, dentists use X-rays more often than any other medical profession.[2] The lack of robust quality assurance programs and their heavy use by children also make radiation safety measures more important to dentists. Statistically, radiation exposure in dentistry is associated with salivary gland tumors, thyroid cancer, meningiomas, and low birth weight babies in pregnant women. The radiation dose used during dental treatment may be low for individual visits, but most of the time patients are exposed to repeat visits and many are exposed during treatment. Dentistry.[3] Therefore, in addition to the significant benefits derived from the diagnostic application of X-rays in both medicine and dentistry, negligence or lack of professional knowledge can lead to the risk of radiation harming living tissues. enough to cause cancer.[4] In terms of radiation dose reduction, the optimization and justification of radiographs today is an important issue for dental professionals.[2] To reduce radiation exposure to patients, the use of lead aprons, thyroid seals, straight collimators, and appropriate technique are introduced into radiological examination practice. Any intentional patient exposure to radiation during examination and treatment should be clinically proven and each exposure should be expected to provide the benefit of a confirmed diagnosis. . Since dental radiographic examination is one of the most frequent radiographic procedures, the radiation risks posed by diagnostic radiography are one of the major public health concerns.[3] Therefore, radiographs should be performed on patients only when the benefit of detecting disease outweighs the risk of radiographic damage.[4] Considering the above-mentioned concerns regarding dental-associated X-ray exposure for both patients and dentists, this study was

conducted with the aim of investigating the knowledge and behavior of dentists. General practitioner practicing in Noida in radiation protection during oral radiographic procedures.

MATERIALS AND METHODS

in Noida before the necessary changes were made and these 50 dentists were included in the main study. Inter-reviewer confidence was found to be 0.8 (Kappa statistic). The questionnaire consisted of a set of 22 questions (in addition to demographics) related to physicians' knowledge of relative radiation exposure in different techniques and their opinions about the role of The role of radiation protection in dentistry. In addition, applying this knowledge appropriately to the criteria for correct patient selection, correct use of equipment, positioning and radiation barriers, and adjustment of exposure dose to protection and protection of their patients from radiation risks was also part of the questionnaire. Out of all the closed questions, there are 3 demographic questions, 7 knowledge questions, and 15 practice questions. Prior to administering the questionnaire, approval was obtained from the organization's ethics committee. The study was conducted over a period of 4 months. Data were calculated and tabulated in a Microsoft Excel spreadsheet, and statistical analysis was performed using SPSS version 21.0. in Noida before the required modifications were made and these 50 dentists were included in the main study itself. The inter-examiner reliability was found to be 0.8 (Kappa Statistics). The questionnaire consisted of a set of 22 statements(apart from demographics) which were concerned with the practitioner's knowledge about the relative radiation exposure in different techniques and their opinion on the role of radiation protection in dentistry. Also, the appropriate application of this knowledge for correct patient selection criteria, right use of equipment and positioning and radiation protection barriers and modification of exposure dose in order to protect themselves and their patients from radiation hazards was also a segment of the questionnaire. Of all the close-ended questions, three were demographic based questions, seven were knowledge based questions and 15 were practice based.

Prior to administration of the questionnaire the institutional ethical committee approval was obtained. The study was completed in a time frame of 4 months. Data was computed and tabulated in Microsoft excel worksheet and statistical analysis was performed using SPSS version 21.0.

RESULTS

Out of all respondents, 59% were males and 41% were females. It was found that 86% owned an X-ray machine. It was seen that 91.7% (324) knew the correct rationale for radiation protection. The answers by the general dentists suggested that most important organ for radiation protection is thyroid (64.8%) [Table/Fig-1]. Out of the total subjects, 69.1% (244) believed that full mouth radiography gave more radiation exposure to patients than panoramic radiography. A 71.1% of the dentists used radiographic film as their radiographic receptor.

It was found that 86.1% (304) preferred selective periapical view in initial visits. The preference on taking radiographs in pregnant women has been shown in [Table/Fig-2]. Only, 19% of the general dentists got periodic check-ups of their machines done whereas, 89% followed bisecting-angle technique for taking radiographs and almost all the dentists accounting to 96% used round collimators. Majority of the general dentists used collimators of length 20cm [Table/Fig-3] and E films [Table/Fig-4]. Only 2% of dentists always used leaded apron and thyroid shield before shooting a radiograph. A total of 74% of the respondents used the same exposure time for all the patients and the locations of the tooth. Only 28.8% of the general dentists followed the position and distance rule correctly, 73.9% of dentists disposed of radiographic films with regular waste and 60.9% flushed the old developer and fixer solutions down the drain.

There was no statistically significant difference found in the adoption of radiation protection techniques adopted in dental practice by male and female general dentists ($p>0.05$) [Table/Fig-5]. However, significant association was found in the knowledge regarding radiation exposure and safety among male and female general dentists [Table/Fig-6]. It was seen in the knowledge based questions lesser female dentists gave correct answers regarding thyroid, being the most important organ for radiation protection, IOPA, the most preferred radiograph for the initial visits, panoramic radiographs delivered less radiation exposure than full mouth radiography and exposure time for mandibular incisors was believed to be more than that for maxillary molar. Dentists who were operating X-ray machines older than five years had an increased tendency to use lead aprons, thyroid collars where as a decreased tendency to use film holders was observed among them ($p<0.05$) [Table/Fig-7]. It was also observed the dentists who used a digital receptor took more radiographs than the ones who used X-ray films [Table/Fig-8].

DISCUSSION

In India, radiation safety protocols and guidelines have been developed to ensure the safest radiation exposure for patients and operators. The preference for selective peri-apical views in initial visits aligns with the ALARA principle, avoiding unnecessary radiation exposure. However, panoramic radiation is preferred for dental implant assessment radiographs. A greater percentage of dentists use conventional radiography, and periodic check-ups of dental X-ray machines are necessary to ensure appropriate radiation exposure without leakage. A well-calibrated dental X-ray machine should have an output of 0.7 to 1R/sec and be done every three years.

The bisecting angle technique is widely preferred for radiographs, but it involves less exposure due to scattered radiation to the thyroid gland and eye and produces more accurate images. The majority of dentists are not affirmative of taking radiographs in pregnant women, as the greatest risk to the fetus for chromosomal abnormalities and subsequent mental retardation is between 8 and 15 weeks of pregnancy.

In Puducherry, Punjab, and Haryana, most dentists use round collimators and E-speed films. However, some dentists dispose of radiographic waste improperly, with 60% disposing it into gutters. In Chandigarh, 96.4% of dentists adopted a safe system for healthcare waste management and disposal, but only 39.8% were sure of following all Occupational Safety and Health Administration regulations. Fewer dentists knew the correct and safe distance rule to be maintained while taking radiographs.

Most dentists did not make any changes in exposure time according to tooth location and patient characteristics, but 72.5% and 65.6% adjusted the exposure time. There was no statistically significant difference in radiation protection techniques adopted by male and female general dentists in the study conducted by Binnal A et al. in Mangalore, India. Dentists operating X-ray machines older than five years had an increased tendency to use lead aprons and thyroid collars, while a decreased tendency to use film holders. In Puducherry, Punjab & Haryana, only 19.2% and 4% of dentists used lead apron and thyroid collars.

A significant statistical association was also observed between the number of radiographs taken per week and the digital receptor used, in line with a study conducted by Berkhout WER et al. in the Netherlands.

LIMITATIONS

Since the sample in the study was not large enough, the results can't be generalized and so further studies are required in this spectrum of research to obtain a better assessment of the radiation protection practice adopted by the general dentists.

RECOMMENDATIONS

College exams in radiology should be done in a complex way to ensure adequate knowledge for aspiring professionals. Upon graduation, practitioners need to link their knowledge with new evidence and this can be done by completing continuing dental education programs. Information about this can be disseminated on social sites because in this way it is easier to reach a large number of dentists. Periodic inspection of the X-ray machine should be made mandatory to renew the subscription. At each renewal, the dentist will receive a brochure/leaflet illustrating any recent evidence-based changes to the recommendations and guidelines provided by the authority. This can help inform dentists of any new information that would benefit their practice in the event that they do not wish to consult articles and reviews on their own. In addition, dentists and medical personnel should also wear filmed badges for individual dosing. They should also regularly/periodically evaluate the quality of X-ray images in their clinics or practice to ensure optimal exposure reduction and suspect any radiation leaks. as soon as possible.

CONCLUSION

The results show that the knowledge and practice applied by practicing general dentists is not sufficient to maintain an adequate protective barrier against radiation and to comply with the ALARA principle. Therefore, methods should be put in place for dentists to more strictly adhere to appropriate radiation protection behaviors and practices and trainers should provide more impactful educational methods and means. for college students to better understand the cycle.

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