

## AWARNESS TOWARDS RADIATION PROTECTION MEASURES AMONG DENTAL PRACTITIONERS IN COORG DISTRICT: A QUESTIONNAIRE STUDY

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### ABSTRACT:

**Aims and objectives:** To assess the attitude and awareness towards radiation protection measures among private dental practitioners in Coorg district.

**Materials and methods:** 40 private practitioners (general and specialist) in Coorg district were included in the study. Information was collected through a questionnaire composed of 24 structured questions regarding knowledge, attitude and perception towards radiation protection.

**Results:** The response rate for survey was 77.5%. All private practitioners were using conventional x-ray machines. 54% of the practitioners were unaware of exposure settings (kVp, mA) of the intraoral radiation machine, where as 38.7% mentioned the kVp setting as 65-70kVp. Film holders were used in a majority of practices (70%). 54.8% practitioners were aware of using collimators. 61.2% were aware of NCRP and AERB recommendations. But, interestingly radiation protective measures like using lead barriers, lead aprons and position distance rule were not followed by most of the private practitioners. None of them were using radiation monitoring device/dosemeter. 61.29% of practitioners never calibrated their intraoral x-ray machines.

**Conclusion:** The awareness of private practitioners of Coorg district towards radiation hazards and protective measures was poor. A majority of private dental practitioners of Coorg did not practice radiation protection procedures. Emphasis on radiation safety in undergraduate curriculum, mandatory continuing professional education and development of radiographic selection criteria is recommended.

Key words: private practitioners' attitude, radiation protection, awareness of radiation protection,

### INTRODUCTION:

Radiographs are an important tool for diagnosis and treatment planning. Since dental radiographic examination is one of the most frequent radiological procedures radiation hazard becomes an important public health concern. Although the radiation doses used by

dentist might be low for individual examinations, patients may be exposed to repeated examinations over time. The amount of radiation exposure from dental radiographs depends on many variables such as film speed, exposure factors, technique used, collimation and

use of protective barrier.<sup>[1]</sup> Technical advances in X-ray equipment and imaging systems have allowed significant reductions in radiation doses to patients during intraoral and extraoral radiography. Despite this evidence, surveys of practicing dentists have shown fairly little acceptance of some dose reduction techniques. The dentist should be aware of different radiation protective methods as well as the daily received radiation dosage <sup>[2]</sup>.

The x- rays are a form of ionizing radiation. Ionizing radiation causes biological effects on tissues via the production of free radicals and causes damage to DNA strands. Radiation acts on living systems through direct and indirect effects. About one third of biologic effects of x-ray exposure result from direct effects and about two third of radiation induced biologic damage results from indirect effects <sup>[3]</sup>.

Compared to medical field, in dentistry it is mainly used for diagnostic purposes and in dental practices usually the practicing dentist exposes, processes and interprets the radiographs. Even though such exposure is less, it is critical to reduce the exposure to the dental personnel and patients in order to prevent the harmful effects of radiation. The cumulative doses are high in dental imaging when compared to medical due to repeated examinations over time. The dental radiograph should be prescribed only for a patient when the benefit of disease detection outweighs the risk of damage from x-radiation <sup>[4, 5]</sup>. To-date,

many types of equipment and techniques have been developed in dental radiography to reduce patient exposure dose. Good radiographic examination uses collimation, use of lead apron, thyroid collar and application of objective selection criteria.<sup>[1]</sup>

X- radiation is harmful to living tissues and its intensity is sufficient to cause cancer, leukemia and genetic damage <sup>[4]</sup>. The dentist needs to be aware of radiation protection measures and the radiation dosage received daily in order to protect themselves and their patients from the harmful effects of radiation. There are about 40 private practitioners in Coorg district. Until now, no data is available regarding awareness of radiation hazards and radiation protection practices in dental clinics in Coorg district. Therefore, a questionnaire study of private dental clinics was designed to gain insight into the knowledge, approach, perceptions and attitude of dentists in Coorg towards quality care and radiation protection.

## **MATERIALS AND METHODS**

The survey was based on 40 practicing dentists in various parts of Coorg district who were willing to participate in the study. A questionnaire which included 24 structured questions was given to the dentists who participated in the study. The sections of the questionnaire were (1) demographic characteristics of dentists, (2) radiographic equipment (3) radiation hazard, (4) radiation protection guidelines, and (5) radiographic waste management.

The statistical analysis was performed using descriptive and non parametric statistics.

**RESULTS**

The response rate was 80%. Of the 40 responders, 19% of the responders were specialist dentist and 81% were general practitioners. 60% had graduated less than 10 years ago, 31% had graduated between 10 years and 25 years ago and 9% had graduated over 25 years.

**Radiographic equipment:-**

Most of the users (59.4%) were not aware of the tube current of their intraoral radiographic machine. In 43.8% of the cases, radiation tubes of 65 kVp to 70 kVp were used. 75% of the dentists claimed to adjust exposure time according to anatomic location, patient characteristics, kVp and film speed. A very large number of responders (78.1%) did not calibrate their machine.

On an average, 30 to 90 intraoral radiographs per month were taken.

12.5% of the dentists, however, took more than 140 radiographs per month. The majority of the dentists (78%) used film holders to hold the film and few made the patient to stabilize the film with finger (21.9). Only 71.9% of them were aware of the usefulness of collimators and filters. A rectangular radiation tube or rectangular collimator was used by only 6.3% of the dentists.

**Radiation hazard:-**

Most of the dentists (84.4%) believe that dental x rays are harmful. There was a mixed response about safety of dental x-rays in pregnancy, 40.6% believe that it is safe and 43.8% believe that it is not safe and 15.6% did not respond to the question.

**Knowledge about properties of x-ray:-**

56.3% believed that x-rays reflect from walls, 18.8% were not aware of the properties of x-rays.

**Knowledge about various radiation protection guidelines:-**

QUESTIONNAIRE	RESPONSE OF DENTISTS		
	Yes	No	Don't know
1. Are you aware of National Council on Radiation Protection (NCRP) and Atomic Energy Regulatory Board (AERB) recommendations?	59.4%	18.8%	21.9%
2. Are you aware of ALARA principles?	46.9%	25%	28.1%
3. Do you think Digital radiography requires less exposure than conventional?	81.3%	-	19.7%
4. Does the high speed film require a reduced exposure?	59.4%	3.1%	37.5%

Table 1- Response of dentists towards various radiation protection guidelines.

**Distance:-**

The ideal position distance was followed by only 34.4% of dentists. Lead apron was used in only 40% of them.

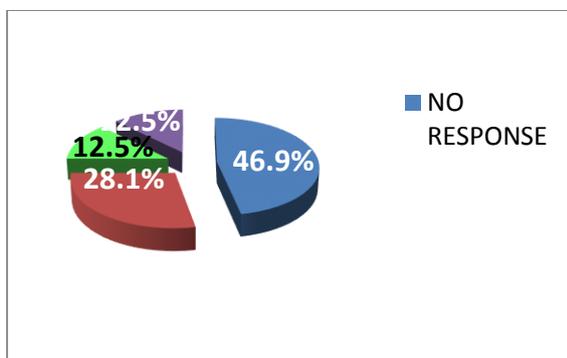
**Shielding wall:-**

Majority of the clinics did not have a protective barrier (56.3%). Only 43.8% of the dentists stood behind a protective concrete / brick wall during radiation exposure.

Majority of them never used dosimeter to measure the radiation (96.9%).

**Radiographic waste management:-**

About half of them (46.9%) did not respond to this question, quarter of the study group disposed them with general waste (28.1%), 12.5% disposed with medical waste and 12.5% buried the radiographic waste (graph 1). These results are similar to study done by BN Praveen et al [6].



Graph 1- Radiographic waste management.

**DISCUSSION**

The exposure parameters of the intraoral radiographic equipment was

analyzed, it was found that most dentists used kVp settings between 65 kV/kVp and 70 kV/kVp, which is in accordance with the guidelines. The dentists were aware of the usefulness of digital sensor, fast speed films. They also used to adjust the exposure time according to anatomic location, patient characteristics kVp and film speed. Relatively large number of dentists (21.9%) asked patient to hold films with their finger. This points to a general underestimation of the potential risks of radiation exposure. Even though a large number of dentists were aware of usefulness collimators (71.9%) they were unaware of the type of collimator which is installed in their x- ray machine. Although rectangular collimators are recommended as per the European guidelines, it is used by only 6.3% of the dentist. The study results are comparable with the surveys conducted in Belgian and Turkey where 6% and 5.5% of the responders used rectangular collimators [7, 8]. The position distance rule was followed by 34.4% of dentist. The rest were not aware of the potential hazard by the x- rays by not following the proper position distance rule. Most of them do not use lead apron (60%). Protective barrier was not used by majority of dentist (56.3%). Education of dentist in this aspect is deemed essential.

The quality of the image produced depends on the optimal exposure parameters and the periodic calibration of the machine. In the present study only 21.9% of the dentists reported that their machine has been serviced annually.

The amount of radiation absorbed by the body must be monitored regularly to prevent the stochastic and deterministic effects produced by the x-rays. But a very large number of responders (96.9%) did not use dosimeter to measure the radiation dose received.

Radiological waste management is also important to prevent environmental damage. The waste processing solutions can be sold to silver refiners [8]. In this study optimum waste disposal method for radiological waste were not followed by the dental practitioners.

The current study results are similar to studies done earlier which show that attempts should be made to improve dentists' knowledge about radiation

dose reduction techniques to minimize unnecessary radiation exposure to dentist, assistants as well to the patient [4-9]. The dentists must update their knowledge in this regard through continuing education program because studies have shown that substantial amount of knowledge is lost by 6-12 months of completion of the training period [10].

## CONCLUSION

In conclusion, the awareness of private practitioners of Coorg district towards radiation hazards and protective measures was poor. They did not use proper radiation protection measures to protect themselves or patient and assistant from radiation.

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