



Knowledge and practices of interns, graduates and post-graduates of Ahmedabad dental college and hospital, Ahmedabad, Gujarat regarding radiographic protection

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Abstract:

Aim: To access the knowledge and practices of interns, graduates and post graduates of Ahmedabad Dental College and Hospital, Ahmedabad, Gujarat regarding radiographic protection. **Materials and Method:** The present cross sectional questionnaire study was conducted in Ahmedabad Dental College, to assess the knowledge and practices of interns, graduates and post-graduates regarding radiographic protection. The study sample included 136 interns, graduates and postgraduates students. The survey was scheduled to spread over a period of 1 month. Data was collected by using self designed questionnaire (Annexure C). The questionnaire was developed in English. Questionnaire was administered by investigator himself to each participant on scheduled days and collected after two days. Collected data was coded, compiled and tabulated. The data was analysed by applying descriptive & inferential statistical analysis using SPSS package version 17. **Result:** Majority of the study subjects were aware of the side-effects of a radiograph on pregnant women and ALARA. On the contrary, almost half of the participants were not aware of NCRP/ICRP recommendations. Majority of the participants were not using lead apron while taking radiographs. Almost all the participants were aware of the symbol of radiation hazard. Most of the participants supported that they would use radiation protection protocols at the time of their private practice. **Conclusion:** The participants had unsatisfactory knowledge about the radiation protection protocols and radiation hazards.

Key words: Radiographic Protection, Interns, Graduates, Postgraduates

Introduction

There are numerous dental diseases that can be diagnosed by the use of radiography. Hence, dental x-rays serve as a significant aid in dental

practice. Since dental practitioners and students operate dental x-ray unit on frequent basis in their day to day clinical practice, there is a high probability amongst them to be exposed to x-rays on regular basis. X-radiations are harmful to living

tissues and it is sufficiently intense to cause cancer, leukemia and genetic damage.

Dental radiology is a rapidly evolving clinical specialty and has been the technique of choice in diagnosis of various dental pathologies. It is generally believed that the risk of radiation associated with dental radiography is not significantly greater than other everyday risks in life.

The effects of x-rays on humans are the result of interactions at atomic levels [1,2]. Harmfulness of the dental x-rays seems to be very prominent when both the deterministic and the stochastic effects caused by dental x-rays on human body are considered. **Deterministic effects** are those effects in which the severity of the response is proportional to the dose. These effects occur in all people when the dose is large enough [3]. Deterministic effects have a dose threshold below which response is not seen. By contrast, **stochastic effects** are those for which the probability of occurrence of the change, rather than its severity, is dose dependent [4]. The stochastic effects thus lay the patient's and the operating personals in a high risk zone as it does not have dose thresholds.

Over the years, certain studies directed en route for the measurement of radiation exposure has shown increased occurrence of cancer, birth defects, cataracts and shortening of life span [5]. The above statement although being non-conclusive and may not hold well for diagnostic dental radiography, it is still acceptable as it cannot be proved that there is no possibility of a hazard. This situation has produced the concept of keeping radiation exposure "As Low As Reasonably Achievable"- The ALARA principle, which recognizes the possibility that no matter how small that dose is, some stochastic effect may result [4,6].

Stochastic effects as stated earlier, are those in which the probability of the occurrence of a change (harmful effects of radiation) does not depend on dose as seen with deterministic effects. Here the effects represent an all or none response i.e. a person even to a minimal radiation exposure either gets affected or does not get affected at all. Considering this, the goal of the radiation protection protocol should focus to prevent the occurrence of deterministic effects and to reduce the likelihood of stochastic effects by minimizing the exposure to patients and the office personnel [4-6].

The above objective can be achieved when the operating personnel empowers thorough knowledge of the dental radiography and apply it in

the clinical situations. Keeping this in mind, the present study was conducted to access knowledge and practices of interns, graduates and post-graduates of Ahmedabad Dental College and Hospital about the radiographic protection. The advantage of the questionnaire study is that, it allows the information to be collected and analyzed easily.

The questionnaire given was prepared as close-ended on most occasions in order to obtain accurate response in relevance to the knowledge and practice. Evaluation of the results showed that most of the participants were aware of the fact that X-rays used in diagnostic dental radiology are harmful and certain levels of precautions should be taken while in use. Among all the groups evaluated, a subtle variation was noted in regard to the knowledge and understanding of the basic physics of radiation.

Material and Methods

The present cross sectional questionnaire study was conducted in Ahmedabad Dental College, to assess the knowledge and practices of interns, graduates and post-graduates regarding radiographic protection.

Ahmedabad is the largest city and former capital of the Gujarat. Ahmedabad is located on the banks of the River Sabarmati, 32 km (20 mi) from the state capital Ahmedabad [7]. The study sample included interns, graduates and postgraduates students of Ahmedabad Dental College and Hospital, Ahmedabad, Gujarat, India.

A list of study subjects was obtained from the head of the institution of the Ahmedabad Dental College and Hospital. The survey was scheduled to spread over a period of 1 month. A detailed weekly schedule was prepared well in advance. Although a detailed schedule was prepared meticulously, few adjustments and changes were done due to logistic reasons. Two days in a week were allotted for conducting the study. A questionnaire related to radiation protocol in the form of multiple choices was given to each participant and the response sheets were collected after 2 days. The data was collected by a single investigator (principal investigator).

A pilot study was conducted on 10% of the total sample size to check the feasibility of the study and to validate the questionnaire. Data was collected by using self designed questionnaire (Annexure C). The questionnaire was developed in English. The questionnaire consisted of 18 questions pertaining to knowledge and practices of interns, graduates and

post-graduates regarding radiographic protection. Prior to the study, the questionnaire was pre-tested and validated. The questionnaire was validated for construct & content validity, reliability and ease of use. Content and construct validity showed no significant changes. Questionnaire showed high degree (0.89) of agreement during test-retest of the questionnaire. Those individuals who participated in the pilot study were not considered for the main study to prevent possible bias.

The purpose and procedure of the study was informed to each participant and also Participant information sheet (Annexure A) was provided to each participant, which explains all the aspects of the study. It was explained to them that they had no obligation to complete the questionnaire and could

abandon it at any point without stating a reason. After explaining the purpose of the study, the informed consent (Annexure B) was obtained from each participant who was willing to participate in the study.

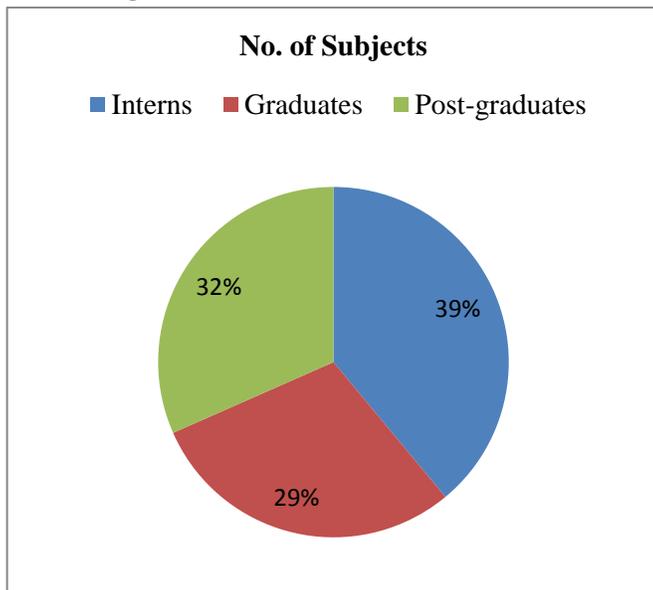
Collected data was coded, compiled and tabulated. The data was analysed by applying descriptive & inferential statistical analysis using SPSS package version 17.

Results:

Table 1: Shows positive findings of question asked to the subjects

Sr. No.	Question	Interns N (%)	Graduates N (%)	Post-graduates N (%)
1	Are dental x-rays harmful?	42(79.24%)	30(75%)	30(69.76%)
2	Do you know the criteria for advising radiograph?	52(98.11%)	40(100%)	42(97.67%)
3	Do you advice dental radiographs for pregnant patients?	35(66.03%)	29(72.5%)	24(55.81%)
4	Are you aware of NCRP/ICRP recommendations?	29(54.71%)	23(57.5%)	24(55.81%)
5	What is ALARA?	52(98.11%)	40(100%)	42(97.67%)
6	The ideal distance an operator should stand (position-distance rule) during dental radiographic exposure is	45(84.9%)	35(87.5%)	38(88.37%)
7	Do you use lead apron while operating on x-ray unit?	27(50.94%)	16(40%)	11(25.58%)
8	Do you know which speed film you use?	50(94.33%)	34(85%)	40(93.02%)
9	Does increase in speed reduce exposure?	46(86.79%)	37(92.5%)	35(81.39%)
10	Does digital radiograph require less exposure than conventional?	48(90.5%)	37(92.5%)	41(95.34%)
11	Where do you wear personal monitoring badges?	11(20.75%)	11(27.5%)	16(37.20%)
12	Which technique do you use for less radiographic exposure?	53(100%)	36(90%)	41(95.34%)
13	Do you know about personal protection and patient protection measures in x-ray unit operating room?	53(100%)	38(95%)	41(95.34%)
14	How do you hold the films during exposure?	46(86.79%)	35(87.5%)	41(95.34%)
15	Will you adhere to radiation protection protocol at the time of your private clinic practice?	50(94.33%)	31(77.5%)	41(95.34%)
16	Are you aware of the radiation hazard symbol?	49(92.45%)	25(62.5%)	40(93.02%)

Figure 1: Shows distribution of subjects according to their education



Discussion

Over the years, certain studies directed en route for the measurement of radiation exposure has shown increased occurrence of cancer, birth defects, cataracts and shortening of life span. The above statement, although, being non-conclusive and may not hold well for diagnostic dental radiography, it is still acceptable as it cannot be proved that there is no possibility of a hazard [2]. Considering this, the goal of the radiation protection protocol should focus to prevent the occurrence of deterministic effects and to reduce the likelihood of stochastic effects by minimizing the exposure to patients and the office personnel. This objective can be achieved when the operating personnel empowers thorough knowledge and apply it in clinical situations.

This study is first of its kind and very few similar studies were available for comparison, the results fits well with our hypotheses that the Knowledge and Practice of interns, graduates & Post graduates towards radiation protection can be limited and this can be applicable to this community as a whole. However, further studies with a larger sample size are required to validate our hypotheses. Moreover the current study is a single institutional based one, hence a cross-sectional study comprising of similar samples utilizing multiple institutional participants are required for authentication.

Evaluation of results of the present study showed that 75% of the participants were aware that dental x-rays are harmful, a substantial decrease in percentage as compared to study carried out by MPV Prabhat and his associates which noted 100% of participants being aware about the harmful nature of dental x-rays [2]. This stresses the fact that awareness about the harmful nature of the x-rays decreased with increase in qualification of the participants.

In the present study, it was observed that 66% of interns supported the fact that dental radiographs are absolutely contra-indicated for the pregnant patients. This result varied from the study carried out by MPV Prabhat [2] and his associates, where, only 6.4% of interns supported this fact. In our study, 54.71% of the interns were aware of the NCRP/ICRP recommendations, which is a strikingly low percentage compared to the study carried out by MPV Prabhat [2], where 100% of the interns were aware of the NCRP/ICRP recommendations.

One of the striking feature of our study was the reduced number of participants wearing lead apron while operating an x-ray unit, considering the beneficial effect of lead apron. In our present study, the percentage of participants that always wore lead apron was 39.7% which is a good increase (though not a significant one) compared to the study carried out by R. Jacobs and his associates amongst the Belgian dentists where only 12% of the dentists wore lead apron while operating an x-ray unit⁸. Various reasons were given by the participants for not wearing lead apron like non availability of apron, increased weight of apron and common apron used by everyone. Some participants preferred to follow position-distance rule rather than wearing lead apron.

Knowledge amongst the participants about speed of x-ray film was encouraging. Most of the participants (92%) in our study were aware about which speed of x-ray film did they use. This fact coincides with the results of the study carried out by R. Jacobs and MPV Prabhat. In our study, it was noted that most of the interns (92.5%) and post-graduates (93%) were aware of the radiation hazard symbol, but this knowledge was significantly low in the graduates compared to interns and post-graduates. Only 62.5% of graduates were aware of radiation hazard symbol.

It can be argued from the study that participants were mostly aware of the radiation protection protocols. However, some fields in radiation protection need special attention to avoid any radiation hazard to the dentist and the patient.

However, this study was a single institution based and further studies with a larger sample size are required for authentication.

Conclusion

The participants had variable and inconsistent knowledge about radiation protection protocols and radiation hazards. The views of the participants varied considerably, as inferred by the results. Thorough knowledge about the principles of radiology, patient and operator's safety measures and radiation hazards needs to be provided in the future Continuing Dental Education programmes. There seems to be a need for further implementation of radiation protection principles. Similar studies with reassurance programme at regular intervals should be carried out at institutional and national level for strict adherence of regulation protocol.

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