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Awareness of radiation exposure among the patients and dental students

Anirudha Kabilan, Revathi Duraisamy*, Dhanraj Ganapathy

Saveetha Dental College, Saveetha University, Saveetha Institute of Medical and Technical Sciences

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ABSTRACT

Dental radiographs are routinely advocated by health care professional in order to aid in diagnosis and treatment planning. Though there has been growing concerns with respect to radiation exposure among health professional, awareness about the risk and the effects among health professionals using radiological procedures is still low. The aim of this study was to determine the Awareness of Radiation Exposure among the Patients and Dental Students. The present survey was conducted to determine the level of awareness of radiation exposure among patients and dental students of radiology. The study hypothesizes that there is low level of awareness of radiation exposure. Based on survey research, the study sampled a total of 100 participants comprising of 68 dental students and 32 patients. Based on the analysis of the returned questionnaires, the findings confirm the study hypothesis showing that level of awareness of radiation exposure was low. Moreover, the level of awareness among patients was lower than among the dental students group. This research paper provides details of the survey and the implications of the findings. The low level of awareness of radiation exposure among dental students and patients alike has been confirmed through the findings from this survey. This finding should be cause for alarm considering that radiation exposure continues to be a growing risk to health professionals and patients using radiological procedures and technologies. With such low awareness levels, many health professionals and1 patients would be exposed to the risk of cancer and other long-term effects of radiation exposure.

* Corresponding Author

Name: Revathi Duraisamy
Phone: +91-7598267022
Email: revathikartikeyan@gmail.com

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INTRODUCTION

Dental radiographs are used very often by dental practices to diagnose and plan a treatment. A study was done in the UK which was estimated that nearly 19 million intraoral radiographs are being taken per yea (Tanner RJ, *et al.,* 2000). The risk of radiation exposure among health professionals using radiology is a widely documented and researched topic. There is evidence that dentists and other health professionals using radiological procedures are exposed to the harmful radiations that often causes cancer and other short and long term effects. For example, a high mortality rate among radiologists in the 1940s and 1950s was caused by leukemia, which was linked to radiation exposure (Yoshinaga, S *et al.,* 2004; Mohan AK *et al.,* 2003). To allow estimation of the risk of fatal cancers, intraoral and panoramic radiograph is used on the radiosensitive sites in head and neck. Highest estimated risks of radiographs are leukemia, thyroid and bone surface cancer (White S.C., 1992). In dentistry, exposure to radiation often occurs during examination and treatment. Apparently, dental care and treatment is based on proper examination, which often requires the use of various tools and techniques such as dental CT, which has a relatively high level of radiation exposure (Cohnen,

M., *et al.,* 2002). Although there has been growing concerns regarding radiation exposure in the larger health profession, awareness about the risk and the effects among health professionals using radiological procedures is still low. A recent study in Northern Ireland to determine the level of awareness of radiation exposure among health professionals revealed that awareness levels were considerably low (Soye, J. A., & Paterson, 2008). Another similar survey in Western Australia confirmed this fact after finding that awareness about ionizing radiation during the common diagnostic imaging procedures was significantly low (Zhou, G. Z., *et al.,* 2010).

The purpose of this research is to determine the level of awareness of radiation exposure among patients and dental students of radiology. The research is based on the growing concerns about exposure to radiation especially in the radiology field. Based on evidence from previous research, the research is based on the hypothesis that there is low level of awareness of radiation exposure among patients and dental students of radiology.

MATERIALS AND METHODS

The study takes the form of a survey research. The survey will entail a selection of a sample population from the patients and dentals students at the university who will be required to complete the survey questionnaire.

The survey questionnaire contained 15 close-ended questions. The questions were divided into two parts. Part 1 included questions on participant demographics such as gender and age. Part 2 included more specific questions about the awareness of radiology exposure. For each question, the participants were required to select the most suitable option from the alternative answers provided. The survey questionnaires were distributed via the participants' email addresses. The participants were given one week to complete and return the filled questionnaires via email.

After the one week provision was over, the returned questionnaires were collected for analysis. Microsoft Excel was used to record the data from the returned questionnaires and then to analyze the data and derive important statistics.

RESULTS

Out of the original 100 questionnaires distributed, 98 were returned, which makes a response rate of 98 percent. However, out of the 98 returned questionnaires, only 95 were usable. Three questionnaires were unusable because of they had not been adequately filled. In terms of participant gender, questionnaires from 47 males and 48 females were actually included in the analysis. In terms of age and occupation/status, figure 1 and 2 below represent the findings respectively.

In terms of awareness of radiation exposure, 86 percent of the participants reported that they were actually aware of the risk of radiation exposure. Considering patients and dental students groups, more dental students were aware of radiation exposure (98 percent) than the patients (56 percent). Despite the high awareness levels in general, the awareness of specific elements of radiation exposure such as the harmfulness of dental X-rays, the reason for radiation exposure being a hazard to patients, the ALARA principle, scholastic and deterministic effects of radiation, and current exposure levels were quite low. On average, the level of awareness about these specific facts of radiation exposure was 43 percent. Again, the dental students were more knowledgeable about these specific facts than the patients.

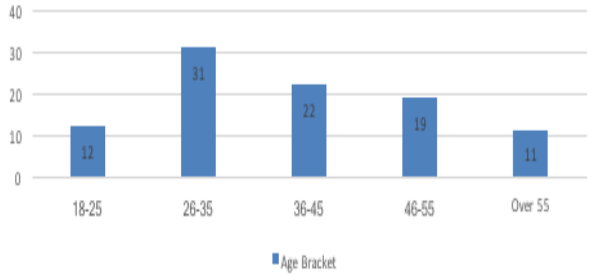

Figure 1: Participant Age

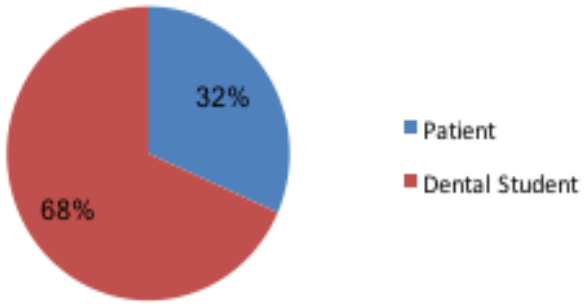

Figure 2: Participant Occupation/Status

Finally, in terms of the need for patient awareness of radiation exposure, the study established that 56 percent of the dental students believed that educating and informing patients about radiation exposure was important. Only 30 percent of the patients held a similar opinion. In terms of patients' responsibility in reducing the risk of radiation exposure, only 40 percent of the participants believed that patients should take some responsibility.

DISCUSSION

In line with previous research studies, this research confirms that the level of awareness of radiation exposure among dental students and health practitioners is low (Jacob, K., *et al.,* 2004; Lee, C. I

et al., 2004). The results further show that the general level of awareness about radiation exposure is low especially with the specific facts such as the scholastic and deterministic effects of radiation. However, the research also confirmed that dental students are more aware of radiation exposure compared to the patients. This finding is not strange. The disparities between the two groups in terms of awareness of radiation exposure can be explained by the fact that dental students have the privilege of learning about radiology and the concept of radiation exposure. On the other hand, patients do not have this privilege. Therefore, compared to the patients, dental students are more likely to have come across the concept of radiation exposure in their learning.

With regard to the importance given to patient awareness of radiation exposure, the findings suggest that most dental students and patients do not think it is important for patients to be aware or informed about the radiation exposure concept. This finding is in line with those of previous surveys that show over 90 percent of patients in CT examination are not given any information on the risk of radiation exposure (Fazel, R *et al.,* 2009). Although the risk of radiation exposure to health professionals performing radiological procedures is well documented and attracts considerable interest, the case is different with patients. Patients using these radiological procedures are often ignored in that radiation exposure is not monitored effectively, which also results in scant data on patient exposure based on longitudinal studies (Ruth A. 2006). The low level of awareness of radiation exposure could be linked to the fact that patients are largely ignored in creating awareness about the risk of radiation exposure. Actually, there will be no clinical significance damaged caused by low level X-rays (Espelid I *et al.,* 2003). Besides that, children are more sensitive to the radiation compared to adults; mainly children have a longer life expectancy to express risk (Nandhini, A and Jayanth, K 2017). The thyroid gland of a child is one of the body part which is most sensitive to radiation compared to and other organs and tissues (Elaine Ron, *et al.,* 1995). One of a recent study stated that chromosome aberrations were occurred in both dentist and patients (Kazhal.S., 2017). If patients undergoing imaging procedures that involve radiology are not informed about the risk of radiation exposure, they will hardly find such information elsewhere. Patient has lack of knowledge regarding the safety of dental radiographs and its benefits (Svenson, B., *et al.,* 1996). The patients may not be radiology students attending courses on radiation exposure.

One amazing finding is the considerably high level of awareness among dental students about the need for informing patients about radiation exposure. About 56 percent of the dental students believed that dental practitioners and radiologists should inform patients about radiation exposure risks. This finding implies that there is a growing level of awareness among radiologists and health practitioners using radiological procedures about creating public awareness on radiation exposure. However, there are still a significant proportion of health professionals who are yet to embrace this idea of informing patients about radiation exposure (Street, R. L 2005).

In line with patient awareness, the survey also focused on the responsibility of patients in reducing the risk of radiation exposure while undergoing radiological procedures. Specifically, the survey asked the participants whether they believed that patients have a responsibility to play in ensuring safety from radiation exposure. Less than half of the participants believed that patients have a responsibility to play. This is a significantly low level of awareness on patient responsibility in radiation exposure. Perhaps this is based on the assumption that patients are only passive participants in treatment while health practitioners are the active participants. This is a false assumption because patients are actively involved in treatment and related decision making (Smith NJ. 1992). The safety measures likelight indications seen when the radiographs in progress and radiation signboards are only noticed by few patients (Kim IH and Muppa-rapu M 2009).

Overall, the findings from the study have confirmed the study hypothesis that there is low level of awareness of radiation exposure among patients and dental students. While general awareness about radiation exposure is considerably high, awareness about specific elements and facts is very low. The increased effective doses of intraoral and extraoral imaging techniques are high enough to justify reconsideration of means to reduce patients' exposure (John, L *et al.,* 2008).

CONCLUSION

The low level of awareness of radiation exposure among dental students and patients alike has been confirmed through the findings from this survey. This finding should be cause for alarm considering that radiation exposure continues to be a growing risk to health professionals and patients using radiological procedures and technologies. With such low awareness levels, many health professionals and patients would be exposed to the risk of cancer and other long-term effects of radiation exposure. The overall implication of this study for the teaching curriculum for dental students should incorporate courses and or topics on radiation exposure. By doing so, students graduating from dental

schools will be knowledgeable about radiation exposure as they join the work environment. Additionally, the students could share this knowledge with their colleagues in the profession as well as patients. Another implication of the study for the health profession is that more efforts are needed to create patient awareness about radiation exposure. Based on the patient-centered approach, health professionals using radiological procedures should engage their patients in their treatment by informing them about radiation exposure. That way, patients will be actively involved in making informed decisions regarding their treatment. This research survey had one major limitation in the fact that it focused on participants from one institution. The findings could not be generalizable to the larger community because of the likelihood of different levels of awareness.

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