

## Radiation Awareness Among Undergraduates In Kuala Lumpur, Malaysia and Chennai, India

Research Article

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### Abstract

Dental radiography, being one of the most appreciated tools used in dentistry, is advantageous to a dentist for an improved diagnosis, treatment planning and monitoring treatment or lesion development. The objective of this study was to assess the knowledge, attitude and awareness of Undergraduates of Saveetha Dental College & Hospitals, Chennai IND whose curriculum embraces physics of X-ray towards biological hazards and radiation exposure. A cross sectional study was conducted among 150 contributors consisting 3rd year, final year and internship dental undergraduates from Saveetha Dental College & Hospitals, Chennai. The information was collected with the help of multiple choices inquiry form consisting 18 questions concerning dental student's knowledge towards radiation exposure. As a conclusion, the knowledge on radiation protection was undeniably moderate among dental students. A lesser proportion of students with 'good' protection knowledge compared to those 'poor' knowledge are concerned about dealing with radiation exposure on every day basis, aware of ALARA protocols, take precautions to prevent radiation and often educate patients about outcomes of radiation exposure. This result needs frequent coaching certainly to provide maximum safety.

**Keywords:** Dental Students; Awareness; Radiation Exposure.

### Introduction

Radiation is defined as a process of emission, propagation and transmission of energy by atoms in the form of waves [21]. Although dental radiology is one of the useful methods in dentistry, mainly for the purpose of diagnosis and treatment planning, it is well known for its ionizing radiation which has biological damaging effects affecting cells directly or indirectly through the production of free radicals [3]. DNA damage, including single or double-strand breaks and DNA protein cross links are one of many complications headed for radiation exposure.

Most authorities now agree that there may be a difficulty to quan-

tify risk of cancer and genetic mutation from radiation exposure to both practitioners and patients (Dds et al., 2017). A statistical association between X-ray exposures in dentistry and increased incidence of salivary gland tumors, thyroid cancer, and intracranial meningioma has been conveyed. Moreover, some complications such as skin erythema, cataract and fibrosis are critical impacts of radiation exposure in higher than safe dosage.

Biological exposure is classified on incidence possibility: Non-stochastic and stochastic effect [14, 17]. When there is a determined dose above which the negative insults start to perform, it is known as non-stochastic or deterministic effect, where as when there is no evidence of deterministic dose that may possibly lead

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to biological destruction is acknowledged as stochastic effect [1]. International System of Radiological Protection (ICRP) has established and sustained since 1928, used world-wide as the common basis for radiological protection ethics, rule, guiding principle, programmes, and practice [19, 16].

Consequently, the ALARA (As Low As Reasonably Achievable) principle was implemented to reduce radiation dose. In general, ALARA principle takes into consideration the justification for the radiological study and taking the imaging examination with the least amount of radiation that can produce radiographs of reasonable diagnostic quality [20]. Operators of radiographic equipment should be thoroughly familiar with radiation safety practices and radiation regulations to protect themselves, their colleagues and the patients [6, 13].

Good radiologic examination practice includes appropriate collimation, use of a lead apron and thyroid collar as well as application of objective selection criteria [2]. The radiation protection knowledge and practice of dental radiography by dentists is consequently crucial. Our recent research portfolio slides numerous articles in reputed journals [4, 11, 25, 15].

Based on this experience we planned to pursue a cross sectional study on radiation awareness dental undergraduate students. As such, this study is conducted with the aim of assessing dental student's knowledge towards biological hazards and radiation and in a way create awareness among the dental students for better safety and quality.

**Materials and Method**

This is a cross-sectional study on radiation protection conducted at the School of Dentistry of the Saveetha University where a questionnaire of 18 multiple choice questions were distributed

among 3rd year, final year and internship undergraduates. There were 53% of 3rd year students, 47% of final year students and 23% of internship students, out of 150 dental undergraduates who had contributed to this questionnaire-based study. The questionnaire consists of demographic details (Year of study, Gender, Country of origin) and followed by questions regarding awareness of dental students towards radiation and its safety guard, as shown in Table 1.

**Results**

The data were tabulated and expressed as graphs (Figures1-7). An equal distribution of participants regarding their nationality is seen in Figure 1, with 75(50%) undergraduate students from Malaysia and 75(50%) students from India. The sample consists of 37% of third year students, 39% of final year students and 24% of internship undergraduates(Figure 2). Out of that 51% were female students and 49% of them were male students, as shown in Figure 3.

Among 150 dental students, 82.93% think dental x-ray is harmful. 4.7% of them are partially aware and the remaining 13% are not aware of x-ray radiation. 48.78 % says X-ray causes ionisation to matter and 22.76% says it does not. Knowledge about ALARA is seen from 72%(Figure 5) of them and out of 52%(Figure 6) follows the principles of ALARA where as the remaining are not aware of ALARA protocols. Among them, 48.78 % take radiograph once a day, 22.76% take radiograph twice a day and 26.01% take radiograph more than twice a day.

Precautions to prevent radiation exposure is taken by 73.98% of students. 13% doesn't take any precaution to prevent radiation and the remaining 7.32% takes precaution only sometimes. Among 123 dental students, 72.36% educate their patient about x-ray radiation whereas 24.39 & doesn't and 3.25% do it only

**Table 1. Shows the questions asked to participants regarding radiation awareness.**

QUESTIONS
Q1. Is dental X-ray harmful?
Q2. Does X-ray cause ionisation to matter?
Q3. Are you concerned that you're dealing with radiation exposure every day?
Q4. Do you know what ALARA is?
Q5. How many times do you take radiographs per day?
Q6. Do you take precautions to prevent radiation exposure?
Q7. Do you educate your patients about radiation effects when radiographs are taken?
Q8. Do you use lead aprons on a regular basis?
Q9. Are you aware of the ideal distance of the operator and the patient while taking an intraoral radiograph?
Q10. Do you wear lead aprons for your patients?
Q11. Do you wear a film badge while taking a radiograph?
Q12. Is there a lead barrier while you're taking a radiograph?
Q13. Is dental radiograph absolutely contraindicated in pregnant patients?
Q14. Are you aware that excessive radiograph exposure may lead to cancer?
Q15. Are you in the range of radiation exposure when you're not taking radiographs?
Q16. Will you educate your fellow friends about the radiation effect?
Q17. Will you obey radiation safeguard protocols at the time of your future private clinical practice?
Q18. Can X-ray be reflected from the barrier of the room?

sometimes(Figure 7). On a regular basis, only 4.06% of students use lead aprons, 92% doesn't and 5.69% use lead aprons only at times. 48.78% of students are aware of the ideal distance of the operator and the patient while taking an X-ray where as 22.76% is not aware.

Results showed 4.06% of students wear lead aprons for their patients sometimes and the remaining 95.93% don't at all. 2.4% of them wear film badge, 93.49% doesn't while taking radiograph.

98.37 & of dental undergraduates says it is absolutely contraindicated to take radiograph for pregnant patient and 0.81% says no. 30.89% claims that there is lead barrier when they are taking radiograph and 54.84 thinks there isn't. 45.52% of students are aware that excessive radiograph may lead to cancer and 40.65% are not aware. The remaining 13.82% think radiation exposure causes cancer only sometimes.

On a regular basis, 39.02% are in the range of radiation exposure

Figure 1. Shows the distribution of nationality of students who have participated in this study.

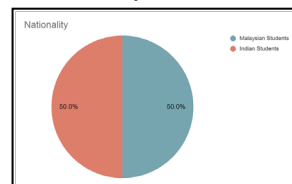


Figure 2. Shows the year of study of the participants.

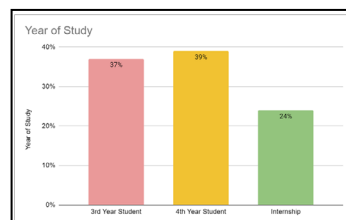


Figure 3. Shows the gender distribution of the participants.

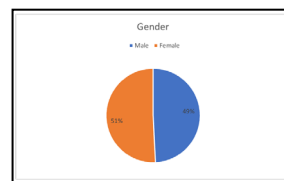


Figure 4. Shows the summary of answers by participants regarding questions based on dichotomous options.

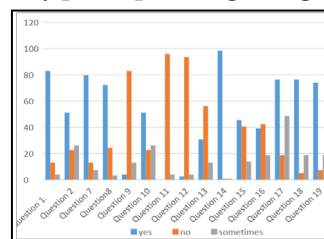


Figure 5. Shows the percentage of participants who are aware of ALARA.

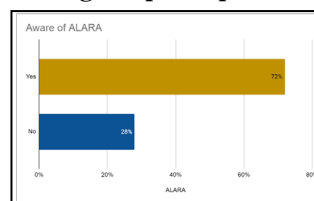


Figure 6. Shows the percentage of participants regarding following the principles of ALARA.

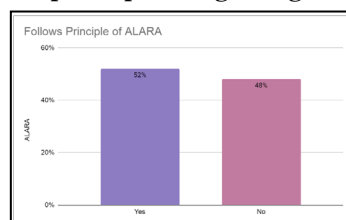
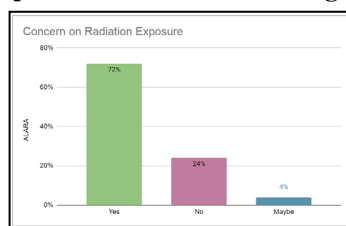


Figure 7. Shows the percentage of participants who are concerned regarding radiation exposure on a daily basis.



and 42.28 are not. 11.38 % do educate their fellow friends always, 48.78% do it sometimes and 18.7% don't. Among the dental undergraduates 76.40% will obey radiation safeguard protocols at the time of their future private practice and 4.87% will not obey. 73.98% says X-ray can be reflected from the barrier of room 7.3% says it doesn't and 18.7% says it reflects only sometimes.

## Discussion

The importance of this study to ensure awareness on knowledge among dental students towards biological hazards and radiation effects. It is clearly seen that dental undergraduates are moderately aware of X-ray radiation especially when it comes to protection and protocols that have to be conducted while taking radiographs. A specially designed lead-impregnated thyroid collar can be used to protect the thyroid gland from excessive or unnecessary radiation during intraoral X-ray exposure [23, 24].

Basheer et al, Oral Radiology, Department of Basic Sciences,[5] have mentioned that his study shows moderate to poor knowledge among Saudi Dental Students. In the other study, which has been performed in Yadollahi et al.,(Iran) [26] 51.2% of radiation employees have relative information about dose limit and the result of our study shows a higher amount of such index (58%). In addition, Enabulele et al., [8] stated that the dental students in his study did have good knowledge on radiation biology but show relatively poorer knowledge on radiation protection.

Despite their poor radiation protection knowledge their practice was better which is similar to the present study conducted among Saveetha Dental College students. Dentists should be knowledgeable on radiation protections in order to properly protect themselves and the patients. A specially designed lead-impregnated thyroid collar can be used to protect the thyroid gland from excessive or unnecessary radiation during intraoral X-ray exposure [12, 10]. Thus, it is important for students to not only have knowledge on radiation effects and its biological hazard but follow the protocols in order to obtain better safety [22, 18, 9].

## Conclusion

Predominantly study shows that students from Saveetha Dental College, Chennai, India and students from Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia are aware of x-ray radiation effect and its biological hazard but do not certainly take steps for preventing unnecessary radiation. This shows the education level of the undergraduate students in both the countries are equal. Being undergraduates, it is undeniable that they are about to practice in private clinics so it is very important to have knowledge on radiation effects and safeguard protocols. They as practitioners should be well-versed about safety updates and availability of new

equipment, supplies and techniques that could further develop diagnostic superiority and reduce radiation exposure.

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