

**Knowledge, Attitude and Perception towards Radiographic Protection and Safety Measures Among Undergraduate and Postgraduate Dental Students**

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**Abstract**

**Aims and Objectives:** To evaluate the knowledge, attitude, and perception (KAP) of undergraduate and postgraduate dental students towards radiation protection and safety measures. To assess the urge for extending the knowledge/awareness towards radiation protection and safety measures among the dental students.

**Materials and Methods:** A cross-sectional A questionnaire survey was performed on 100 subjects and the source of data includes undergraduate and postgraduate dental students studying in Thai Moogambigai Dental College located in Chennai. A questionnaire which encloses 10 structured questions was distributed among the participants and the collected information was subjected to statistical analysis. Independent samples *t*-test, at  $P = 0.05$  significance level, was used for analyzing the data collected. The results were assessed by software IBM SPSS Statistics for Windows, Version 20.0.

**Results:** The present study revealed 83.3% correct response from undergraduates followed by 62.3% from postgraduates. The overall correct response was 79.5%.

**Conclusion:** The results from the present study conducted reveals that the KAP level regarding the radiation protection was low to average among dental students. It is recommended that the curriculum of dental radiology should be extended to provide sufficient clinical knowledge regarding radiation protection, so that students would have proper knowledge on the principles of dental radiography.

**Keywords:** Hazard, knowledge, perception, protection, radiation

**Introduction**

A radiograph serves as an important source of investigation and helps us to give a proper diagnosis.<sup>[1]</sup> In spite of having various advancements in oral and maxillofacial radiology, it also causes radiation hazards which can be direct or indirect.<sup>[2]</sup> The free radicals play a vital role in causing damage to the living tissues and to prevent and reduce such harmful effects, it is important to

have a thorough knowledge about the exposure parameters and radiation protection and safety measures.<sup>[3]</sup>

Although the diagnostic details provided by radiographs may be a benefit to the patient, it also leads to carcinogenesis.<sup>[4]</sup>

The dental radiographs should be prescribed only when benefit of disease detection dominates the risk of damage from radiation exposure and is necessary to follow the ALARA principle.<sup>[5]</sup> Even after having knowledge on radiation protection and safety measure, negligence sometimes leads to unnecessary radiation effects.<sup>[6]</sup>

On reviewing the literature, the number of studies regarding the radiation protection and safety measures which are followed by the dental students are less, hence there is an urge to extend the knowledge of various

radiation safety and protection measures in undergraduate and postgraduate dental students by means of a questionnaire study.

### Materials and methods

A questionnaire survey was performed on 100 subjects and the source of data includes undergraduate and postgraduate dental students studying in Thai Moogambigai Dental College located in Chennai. A questionnaire which encloses 10 structured questions was distributed among the participants and the collected information was subjected to statistical analysis. (Ref table 1)

### Table 1 survey questionnaire

Year of study

UG

PG

Gender \*

Female

Male

Are you aware of harmful effects of radiations? \*

Yes

No

Do you regularly prefer using lead aprons? \*

Always

Never

Frequently

Occasionally

Do you stand behind a protective wall during exposure? \*

Always

Never

Frequently

Occasionally

Can you advise dental radiographs in pregnancy? \*

Yes

No

Which of the following do you use to measure radiation exposure dosage? \*

TLD badges

Led goggles

Gonad shield

Lead apron

Do you advise your patients to wear lead aprons and thyroid collars? \*

Always

Frequently

Occasionally

Never

What is the distance between patient and the operator in absence of lead barrier? \*

4 feet

4-6 feet

6 feet

7 feet

Does digital radiography require less exposure than conventional? \*

Yes

No

Maybe

What is the expansion of ALARA principle? \*

As low as reasonably attainable

As low as reasonably achievable

As low as radiation allows

As low as reasonably allowable

Which do you think will, increase the awareness of dentist towards radiation hazards? \*

Articles and journals

Internet updates

Cde programs and work shops

Curriculum

**Statistical analysis**

Independent samples *t*-test, at  $P = 0.05$  significance level, was used for analyzing the data collected. The results were

assessed by software IBM SPSS Statistics for Windows, Version 20.0.

**Results**

**Responders**

The study participants included 100 subjects; they were classified to 82 undergraduate, 18 postgraduate students. The response rate was 30.5% male and 69.5% female among the undergraduate students, while 22.2% male and 77.8% female among postgraduates. (Ref Table 2)

Table 2 classification of participants based on grouping

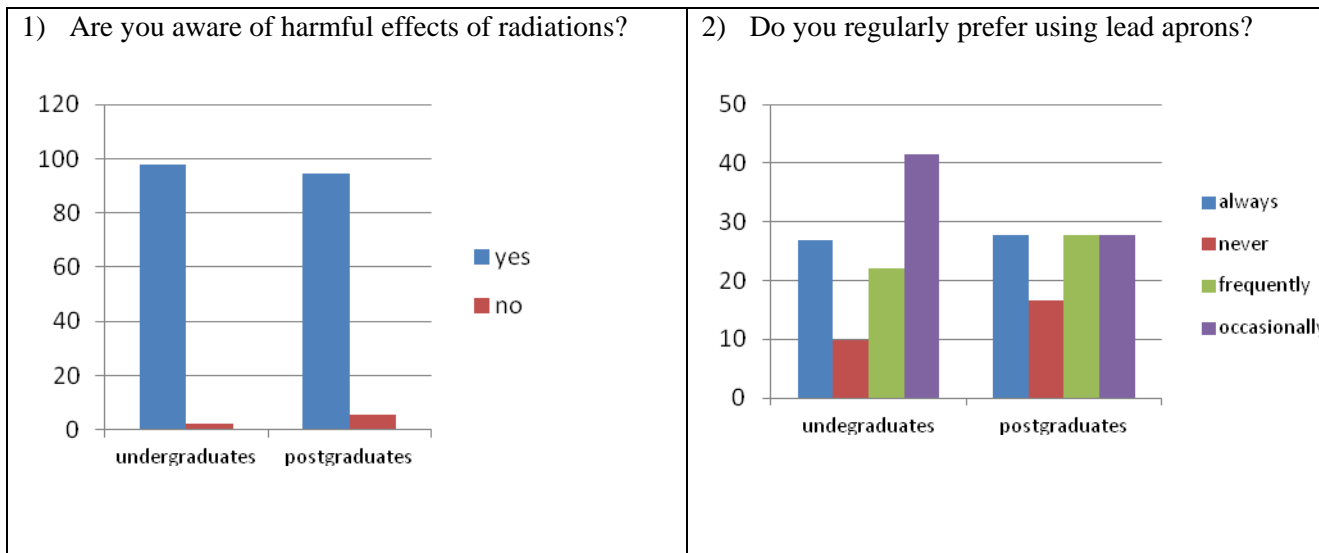
|        |        | Group          |            |               |            | Total |
|--------|--------|----------------|------------|---------------|------------|-------|
|        |        | undergraduates |            | Postgraduates |            |       |
|        |        | Count          | percentage | Count         | percentage |       |
| Gender | Male   | 25             | 30.5       | 4             | 22.2       | 29    |
|        | Female | 57             | 69.5       | 14            | 77.8       | 71    |
| Total  |        | 82             | 100        | 18            | 100        | 100   |

**Comparison between KAP among undergraduates, and postgraduate dental students:**

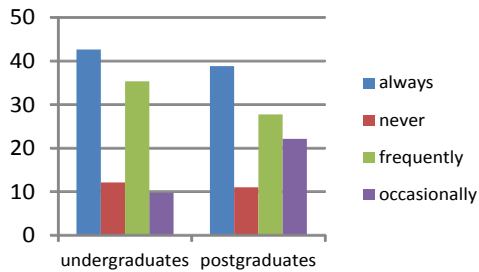
The response of the undergraduate students, when compared with postgraduate students showed insignificant difference in majority of questions except “Which of the following do you use to measure radiation?” Where the postgraduate students gave the correct answer more than

the undergraduate students with  $P < 0.05$  For the question “Does digital radiography require less exposure than conventional?” the postgraduate students gave the correct answer more than the undergraduate students with  $P < 0.05$ .(refer table 3)

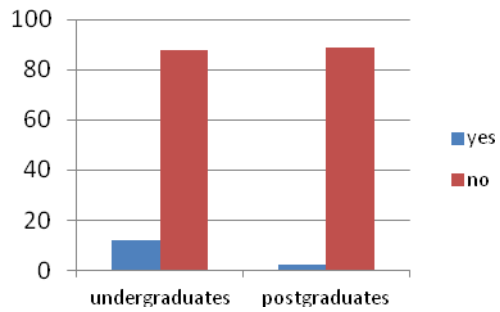
Table 3 responses for the questions



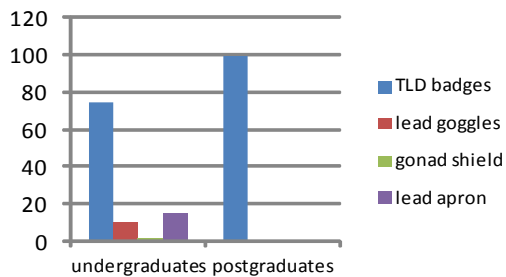
3) Do you stand behind a protective wall during exposure?



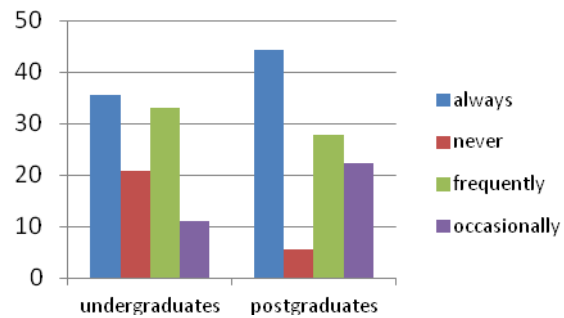
4) Can you advise dental radiographs in pregnancy?



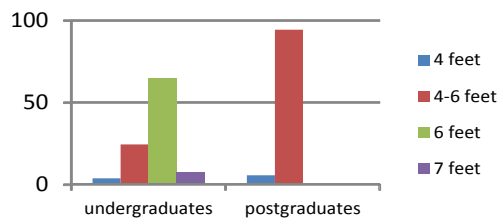
5) Which of the following do you use to measure radiation exposure dosage?



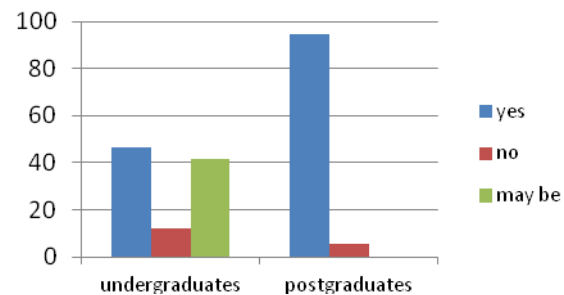
6) Do you advise your patients to wear lead aprons and thyroid collars?

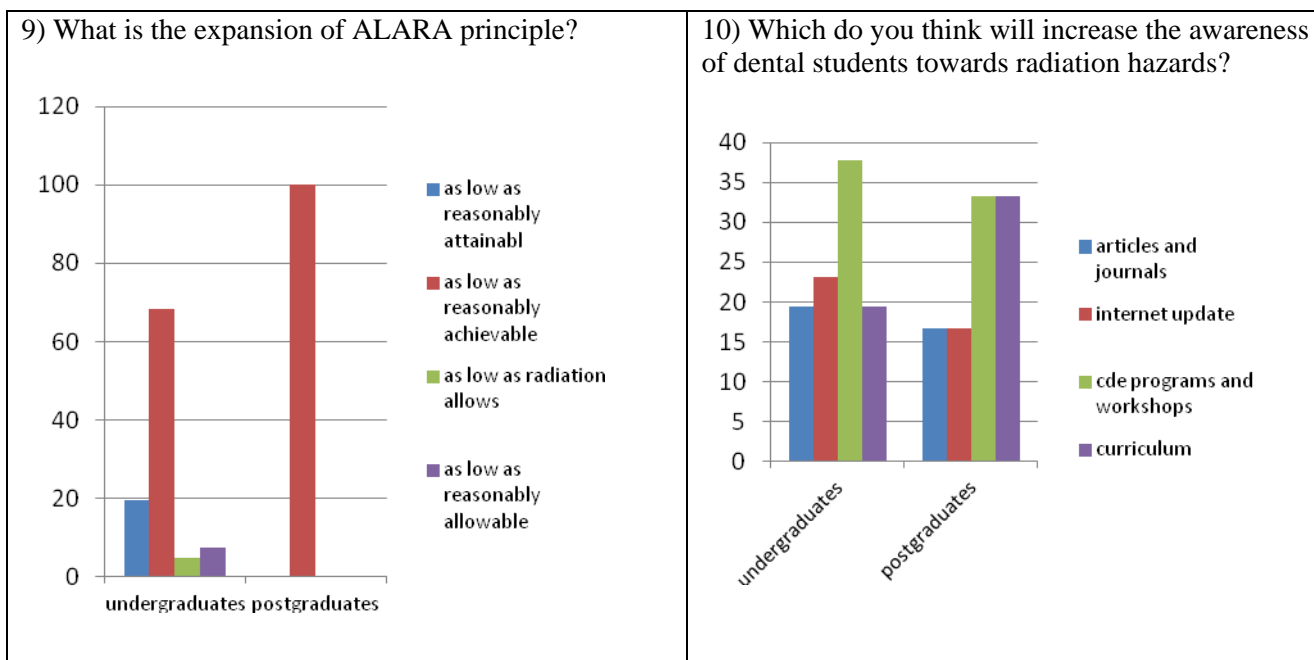


7) What is the distance between patient and operator in absence of lead barrier?



8) Does digital radiography require less exposure than conventional radiograph?





### Discussion

Results from this study shows that out of 100, 97 students (97%) were aware of radiation hazards whereas Shah *et al.* reported 83% and Prabhat *et al.* reported 89% in their subjects, 83.3% students knew that dental X-rays are harmful<sup>[7],[8]</sup>.

Although the radiation exposure which is encountered in dentistry is minimal, its harmful effects cannot be eliminated. On the other hand, the literature had reported the noncompliance of dental students with these radiation protection guidelines worldwide. There is a definite need to identify the pitfalls which retards effective implementation of radiation protection guidelines among undergraduate and postgraduate dental students. This will lead to implementation of radiation protection practices for the benefit of both patients and operator

Over the years, certain studies focused on method for the measurement of radiation exposure has shown increased occurrence of cancer, developmental 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 radiological hazard<sup>[9]</sup>. This situation has directed to the concept of keeping radiation exposure “As Low As Reasonably Achievable”- The ALARA principle. Results from the present study showed that 74% participants knew about the ALARA principle; whereas Shah *et al.* reported 98.6% and Prabhat *et al.* reported 84%<sup>[7],[8]</sup>.

When questioned about awareness on radiograph during pregnancy, 88% of students were against taking radiograph during pregnancy whereas in study reported by rahul srivastava 59.8% students were against taking radiographs during pregnancy<sup>[10]</sup>. There have been some literatures which have proven that radiation exposure to the thyroid during pregnancy is associated with low birth weight. A protective thyroid collar substantially limits radiation exposure to the thyroid while taking dental radiographs<sup>[15]</sup>.

Since every reasonable safety measure should be taken to reduce radiation exposure, protective thyroid collars and aprons should be worn whenever possible. This is advised for all patients, especially for children, women of childbearing age, and pregnant women.

The operator should stand at least 6 feet from the patient at the angle of 90° to 135° to the central ray of X-ray beam<sup>[14]</sup>. In the present study conducted 70% of students know about the correct position and distance rule. In the study reported by Arnout an average 65%, knew the correct answer<sup>[11]</sup>.

Response for knowledge regarding device used to measure radiation dosage, in the present study 79% students gave the correct answer whereas in the study reported by rahul srivastava 69.5% students gave the correct answer<sup>[10]</sup>. The best method to ensure that personnel are following recommended safety measures is by the use of personal monitoring devices. Various types of dosimeters including the thermo luminescence dosimeter, photoluminescence glass dosimeter, or optical stimulated luminescence dosimeter. These devices can be used to measure the radiation exposure<sup>[13]</sup>.

Response to the question asked regarding the knowledge of exposure dosage for digital and conventional radiograph 55% students gave the right answer whereas in the study reported by rahul srivastava 62.6%<sup>[10]</sup> students gave the correct answer<sup>[10]</sup>. It has been proven that digital imaging for intraoral radiographs requires about half the exposure of E-speed film. The digital intraoral receptors require less radiation exposure as compared to conventional radiographs<sup>[14]</sup>. Minimal use of digital radiography in dentistry may be due to various factors such as cost, discomfort to patients due to rigid sensors, lack of knowledge and difficulty in handling digital image developing and processing.

For the question regarding updating the knowledge towards radiation protection and safety measures the results revealed that the students believed they need CDE programs to update their knowledge regarding the radiation protection and safety measures. In a study conducted by Amin Tavakli *et al.* also revealed that the

dentist believes they need continuing education programs in radiology to update their awareness.<sup>[12]</sup>

It is very important for dental practioners and dental students to keep updating their knowledge about new trends in diagnostic techniques, protective and safety measures, etc., This can be attained by means of cde programs, journals, workshops etc.

### Conclusion

The results of this KAP study revealed the knowledge and awareness regarding radiation safety and protection measures were less among dental students. The present study highlights the need for training and CDE programs for improving the awareness and knowledge on effective radiation protection and safety measures among dental students. It is recommended that the curriculum of dental school should be extended further to improve the knowledge on radiation protection and safety measures so that students on graduation will have proper knowledge about principles governing the radiation safety and correct practice of ALARA.

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