

ASSESSMENT OF RADIATION EXPOSURE AWARENESS AMONG MEDICAL AND DENTAL INTERNS: A QUESTIONNAIRE-BASED CROSS-SECTIONAL STUDY

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ABSTRACT

INTRODUCTION

Radiology is an integral part of modern medicine, but there are known potential risks of ionizing radiation that can lead to serious health hazards. Many studies indicate that primary care physicians are unaware of the risks associated with the use of radiation which is a growing concern. The objective of this study was to assess the knowledge of radiation awareness among medical and dental interns at UCMS-TH.

MATERIAL AND METHODS

A cross-sectional study was conducted among medical and dental interns at UCMS-TH, Bhairahawa, Nepal. One hundred eighteen participants were included in the study based on inclusion/exclusion criteria over a four-month period (from July to October 2018). Participants were surveyed by using the MCQ questionnaire and data were analyzed using SPSS software version 20.

RESULTS

A total of 118 interns (78 medical and 40 dental interns) participated in this study. The mean score of knowledge of medical interns was 6.95 ± 3.04 , range 1 to 13 out of 14. In a questionnaire survey, 52.6% had good knowledge and 47.4% had poor knowledge about radiation. The mean score of knowledge of dental interns was 8.03 ± 2.58 , range 1 to 13 out of 14. In a questionnaire survey, 75% had good knowledge and 25% had poor knowledge about radiation.

CONCLUSION

The general knowledge of radiation awareness was good among medical and dental interns, but the radiation awareness of dental interns was higher than that of medical interns. It was recommended that courses/seminars/training courses on radiation protection for medical students to be held and conducted.

KEYWORDS

Radiation Protection, Awareness, Medical and Dental Interns

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INTRODUCTION

Radiology is an integral part of modern medicine. Many diagnostic and interventional radiological procedures involve exposure to ionizing radiation for accurate diagnosis of diseases and injuries.¹ Ionizing radiation damage human cells because it creates many side effects in biological system due to accumulation of free radicals. It can directly or indirectly damage DNA by breaking single or double strands.² Several studies of imaging utilization found that patients were undergoing high doses of radiation (>5 rem) per year. The NCRP reported that radiation exposure from medical imaging has increased sevenfold since 1980.³

Therefore, the feasibility of an imaging study must be determined by considering risks and benefits.⁴ Hence, it is important for professionals to know the criteria for accurate imaging.⁵ ICRP provides guidelines for limiting radiation dose and preventing related risks.⁶ The objective of this study was to assess the knowledge of radiation awareness among medical and dental interns at UCMS-TH, Bhairahawa.

MATERIAL AND METHODS

A cross-sectional study was conducted in the Department of Radiodiagnosis and Medical Imaging, Universal College of Medical Sciences & Teaching Hospital (UCMS-TH), Bhairahawa, Rupandehi, Nepal. The present study was conducted after taking the approval from Institutional Review Committee (IRC), UCMS-TH Registration No: UCMS/IRC/106/18. The duration of the present study was four months from July to October 2018. According to the UCMS-TH administration, there were a total of 166 (110 medical and 56 dental) interns. The total sample size of the present study was 118, obtained by Slovin's formula.

A questionnaire consisted of two parts and was distributed to all medical and dental interns who were willing to participate. First, it deals with the socio-demographics of participants and their education. Second, it consists of 14 MCQ questions that assess practical knowledge of ionizing radiation, radiological equipments, radiation hazards & biological effects of ionizing radiation, radiation protection, ICRP recommended dose limits and personal protection. The questions were developed based on knowledge and practice. Each correct answer received a "1" score, and there was no negative score for incorrect answers. Levels of awareness have been classified on the basis of mean score: A score of 7 or higher indicates high radiation awareness; a score of lesser than 7 indicates low radiation awareness.

The significant inclusion criteria for this study included the participants' medical and dental interns of UCMS-TH, the age and gender participants, and the interns who gave informed consent. The exclusion criteria were medical and dental interns of UCMS-TH who did not give written consent after an explanation of the study. In the present study, the questionnaire was distributed after taking approval from participants.

Data were collected and analyzed using descriptive statistics with Statistical Package for Social Sciences (SPSS) version 20. After data analysis, the study results were presented in

numbers, figures, and tables. In this study, we presented the Participants' knowledge and awareness of ionizing radiation as a means \pm standard deviations.

RESULTS

A total of 118 interns participated in the present study, 78 (66.1%) participants were medical interns and 40 (33.9%) were dental interns with a medical: dental intern ratio of 2:1. Among 78 medical interns, 56 were male (71.8%) and 22 were female (28.2%). Participant demographics are presented in Table 1. Also, the demographic information of medical interns with the average mean correct answer score was 6.95 ± 3.04 out of 14. The range of scores varied from 1 to 13 out of 14 correct answers (Table 2). The mean age of the study participants was 25.40 years.

Table 1. Demographic characteristics of participants, n=78

Participants	Frequency	Percentage (%)
Gender		
Male	56	71.8
Female	22	28.2
Age (In year)		
20-30	68	87.2
30-40	10	12.8
> 40	0	0

Table 2. Marks scored by medical interns, n=78

Valid	78
Missing	0
Mean	6.95
Median	7.00
Mode	4
Std. Deviation	3.04
Range	12
Minimum	1
Maximum	13

In a questionnaire survey of medical interns, 52.6% had a good knowledge of radiation and 47.4% had a poor knowledge of radiation, as shown in figure 1. Consequently, 91% of participants were exposed to ionizing radiation numerous times within a month and 9% were not generally exposed to ionizing radiation. Surprisingly, 87.2% did not attend any lectures/seminars on the topic of radiation protection. 47.4% correctly knew the acronyms of ALARA. Only 35.9% of participants agreed that the maximum radiation exposure occurs in CT scans. 41% believed that MRI has maximum radiation exposure. 20.5% answered that the maximum radiation exposure occurs from the X-Ray machine. Amazingly, 2.6% answered that maximum radiation occurs in USG. 35.9% knew that radiation exposure from MRI is 0 as compared to chest x-ray. 55.1% identified the severity with absorbed dose. Only 46.2% were aware of the annual whole body dose for the public and radiation workers. 75.6% were aware of the cardinal principle of radiation protection. 37.2% had knowledge of the stochastic effects of radiation. 75.6% specified correctly that the most important organ that must be protected during dental radiography like thyroid. 48.7% stated correctly that the unborn child was most radiosensitive. 47.4% knew that X-rays cause radiation

damage primarily due to their ionization properties. 57.7% correctly stated that the sensitivity of body tissue to radiation depends on the mitotic rate of the cells. Of all the interns, 38.5% correctly stated that the female breast is the most sensitive to radiation-induced cancer.

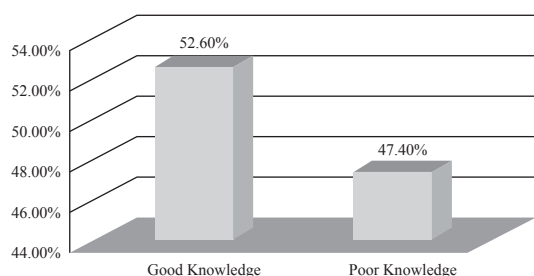


Figure 1. Level of knowledge of medical interns

Among 40 dental interns, 13 (32.5%) were male and 27 (67.5%) were female as shown in figure 2. The demographic information of the average mean score of correct answers was 8.03 ± 2.58 , range 1 to 13 out of 14 (Table 3). The mean age of participants was 24.08 years.

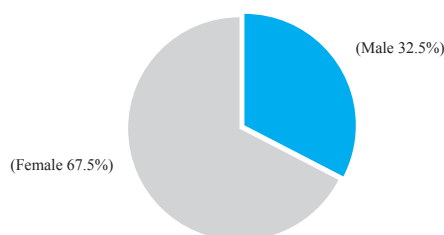


Figure 2. Number of male and female participants

Table 3. Marks scored by dental interns, n=40

Valid	40
Missing	0
Mean	8.03
Median	8.00
Mode	8
Std. Deviation	2.58
Range	12
Minimum	1
Maximum	13

In a questionnaire survey of dental interns, 75% had good knowledge of radiation, and 25% had poor knowledge of radiation as shown in figure 3.



Figure 3. Level of knowledge of dental interns

Consequently, 95% of participants were exposed to ionizing radiation numerous times within a month and 5% were not generally exposed to ionizing radiation. Surprisingly, 67.5% did not attend any lectures/seminars on the topic of radiation protection. 90% correctly knew the acronyms of ALARA. Only 55% of participants agreed that the maximum radiation exposure occurs in CT scans. 17.5% believed that MRI has maximum radiation exposure. 27.5% answered that the maximum radiation exposure occurs from the X-Ray machine. Amazingly, none of them answered that maximum radiation occurs in USG. 32.5% knew that radiation exposure from MRI is 0 as compared to chest x-ray. 42.5% identified the severity with absorbed dose. Only 42.5% were aware of the annual whole body dose for the public and radiation workers. 97.5% were aware of the cardinal principle of radiation protection. 40% had knowledge of the stochastic effects of radiation. 70% specified correctly that most important organ that must be protected during dental radiography like thyroid. 65% stated correctly that the unborn child was most radiosensitive. 82.5% knew that X-rays cause radiation damage primarily due to their ionization properties. 80% correctly stated that the sensitivity of body tissue to radiation depends on the mitotic rate of the cells. Of all the interns, 42.5% correctly stated that the female breast is the most sensitive to radiation-induced cancer.

DISCUSSION

A very few similar studies were available for comparison to assess knowledge about radiation. Therefore, in the current scenario of frequently prescribing Radiodiagnosis, it is important to determine the level of awareness of radiobiology. A total of 118 participants (78 medical interns and 40 dental interns) in the study found that 52.6% of medical interns had good radiation awareness and 47.4% had poor radiation awareness (mean radiation knowledge score = 6.95). The previous study done by Osman H. et al 2017 reported that the majority of medical students and interns at Tabuk City Medical College, Saudi, had poor radiation awareness 36.65% and 31.78% respectively.⁷

Also, 75% of the dental interns had good radiation awareness and 25% had poor radiation awareness (mean radiation knowledge score = 8.03). This study disagreed with the study done by Furmaniak KZ et al 2016 stated that the mean score of the dental students was 8.13 out of 13 (62.53%). From the results, it can be concluded that dental interns had a higher radiation awareness than medical interns.⁸

In the present study, 41% of medical interns and 17.5% of dental interns believed that the maximum radiation exposure was from MRI. 2.6% of medical interns stated that the maximum radiation exposure occurs from USG. Amazingly, none of the dental interns reported that the maximum exposure to radiation was from USG. These results were more or less consistent with the results of Dellie ST et al 2014 reported that 71.4% and 79.3% students incorrectly believed that Ultrasound or MRI either emit ionizing radiation or they do not know whether they emit radiation or not.⁹

The present study showed that 75.6% of medical interns and 97.5% of dental interns were aware of the Cardinal Principle of Radiation Protection, which was less or more consistent with the results of Kasat O V et al 2017 only 14.7% of dentists were aware of the position and distance rule used when protective barriers were not in place.¹⁰

A total of 87.2% of medical students and 67.5% of dental interns reported that they had not attended any formal radiation protection courses or seminars. These results were more or less consistent with the results of Lee AM et al 2017, which showed that 64% of the interns reported no formal training in radiation protection.¹¹

The present study showed that 46.2% of medical interns and 42.5% of dental interns had a good knowledge of the annual radiation dose to the public and radiation personnel. These results were more or less consistent with the results of Lee AM et al 2017, stated that 71% of the interns were aware of the patient's radiation dose.¹¹

The study was conducted only among UCMS-TH medical and dental interns. Therefore, the results of the study cannot be generalized to other settings and populations.

CONCLUSION

The general radiation awareness among medical interns and dental interns was good, but the radiation awareness of dental interns was higher than that of medical interns. This may be due to the respective course content. The dental course includes oral radiology as a major in the third and fourth years of the degree and they have a clinical practice in the dental radiology department.

The medical interns received only 15 days of clinical internship in radiology. This was one of the main reasons they had less radiation awareness. After the overall analysis, it can be concluded that dental interns have a higher radiation awareness than medical interns. Also, it has been recommended that from time to time courses/seminars/training on radiation protection and safety for medical students will be needed.

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CONFLICT OF INTEREST

None

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