



Study of Knowledge on Radiation Hazards and Radiation Protection among Medical College Students in Coastal Karnataka

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ABSTRACT

Introduction: The use of ionizing radiation in medical imaging for diagnostic and interventional purposes has risen dramatically in recent years with a concomitant increase in exposure of patients and health workers to radiation hazards.

Objective: To study the knowledge on radiation hazards and radiation protection among MBBS students in Dakshina Kannada district.

Methods: A cross-sectional study was conducted among 134 medical students. The study comprised of administration of standardized semi-structured pre-tested questionnaire to obtain information on socio-demographic characteristics, knowledge of radiation hazards and radiation protection. Knowledge was scored, +1 was given for the correct answer and 0 for the incorrect answer. Scoring was done. Statistical analysis was performed using Microsoft Excel 2016 software and descriptive statistics were expressed.

Results: The participants were aged between 18 to 22 years above, most of them were females. 93.27% of subjects had good knowledge of radiation hazards. 78 % of subjects had good knowledge of radiation personal protective devices. 6 % of subjects had poor knowledge of both radiation hazards and radiation protection.

Conclusion: In conclusion, the students in the present study had good knowledge of radiation hazards but show relatively poorer knowledge of radiation protection. We are recommended that the curriculum of medical college be expanded further to provide better exposure to radiation protection and its practice so that these students on graduation will be well-grounded with the best principle of radiation protection. This in turn helps in the protection of the patients, operator and public from the harmful effects of radiation.

Key Words: Radiation, Students, Radiation protection

INTRODUCTION

X-rays are a type of ionizing radiation. The use of ionizing radiation in medical imaging for diagnostic and interventional purposes has risen dramatically in recent years.¹ As a result of this concomitant increase in exposure of patients and health workers to radiation hazards. X-rays have the potential to cause harmful effects and are liable to cause cancer and genetic damage.^{2,3} The reports from different studies demonstrated a dramatic rise in the prevalence of adverse health effects following exposure to ionizing radiation over the past two decades,^{4,5} the documented evidence of poor knowledge

of radiation safety among various cadres of health workers at risk of occupational exposure shows the enormity of the problem at hand.⁶⁻⁸

The principle of radiation protection is to do those things that will minimize exposure of the patient, health workers and the public to provide benefits for the patient from the use of radiography. Medical students should have a thorough knowledge of radiation hazards and their protection protocols. The knowledge related to radiation is provided to all students during undergraduate training in colleges. Eventually, these students will start working in the radiology department after

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the completion of the course. Hence, their knowledge in radiation hazards and radiation protection protocols are provided in the medical curriculum is comparatively less. This makes us study the knowledge on radiation hazards and radiation protection among MBBS students.

MATERIALS AND METHODS

A cross-sectional study was done among 2nd-year MBBS students of a Medical College in Dakshina Kannada from January 2020 to February 2020. All the students in 2nd-year MBBS were included in the study by the Universal sampling Technique method. The study was comprised of 134 students. A pre-tested structured questionnaire was used for the collection of data. Informed consent was taken from all the students and confidentiality was assured about the information obtained during the study. The participants were told to answer the questions and were not allowed to discuss the matters in the questionnaire. The questionnaires consisted of 13 questions. The First 8 questions were regarding the knowledge on radiation hazards and the last 5 questions were related to knowledge on radiation protection. The responses were collected within 30 min. Exclusion Criteria: All those who were absent during the time of study and not willing to participate were excluded from the study. Ethical clearance was taken from the institutional ethics committee.

Statistical analysis was performed using Microsoft Excel 2016 software and descriptive data were expressed as frequencies and presented in the form of tables. Knowledge was scored, +1 was given for the correct answer and 0 for the incorrect answer. Scoring was done. Score 0-2 was considered as poor knowledge, 3-5 considered as average knowledge and >5 as good knowledge. Similarly scoring for radiation protection less than 2 was poor knowledge, 2 to 3 is average and more than 3 is good knowledge.

RESULTS

Table 1 shows that majority of students belonged to age 20. Female (58.96%) were more than the Males (41.04%). More students were belonging to Kerala (38.80%) followed by Karnataka (32.08%).

Table 2 shows the knowledge on radiation hazards in which more than 92% of the study subjects have given correct answer for all the questions on radiation hazards. Only in acute radiation sickness, 82.05% of study subjects were given correct answer followed by the cataract of the eye lens 86.56%.

In Table 3 the knowledge on radiation protection was comparatively less for gonad shields (55.22%) and thyroid shields (62.68%) as a protective device among study subjects.

In table 4 knowledge score on radiation hazards was good at 78.35% and the average among 14.92% of study subjects. Knowledge score on radiation protection was good at 48.50% and above average among 29.85% of the study subjects.

DISCUSSION

This study was conducted among second-year MBBS students. A total of 134 students was included in the study. It comprises 55 males and 79 females. The minimum age of the study subject was 19 years and the maximum age was 24 years.

In the present study, 93.27% of study subjects were given correct response to the questions given to assess knowledge on radiation hazards. The study was done by Srivastava, et al on knowledge, attitude, perception toward radiation hazard and protection showed that after the evaluation of overall response among 174 students, 104 (59.8%) showed a correct response.⁹ The study done by Nagaraj, et al. on Knowledge and perception toward radiation protection protocols among dental students showed that the overall correct responses given by PG students and interns were 75.5% and 55.5%, respectively, for the questions given to assess knowledge on radiation hazards.¹⁰

The study done by Salaam AJ et al. on-Knowledge Attitude and Practice of Radiology among Final Year Medical Students in Jo's university teaching hospital in Nigeria showed that out of 124 students only 28.2% students responded that the practice of radiology is hazardous.¹¹ In the present study 133 (99.25%) students stated that exposure to radiation causes the hazards like Congenital malformations in babies delivered by pregnant women exposed to ionizing radiations and Cancers such as skin cancer, leukaemia.

In the present study, 78 % of study subjects had given correct response to the questions given to assess knowledge on radiation protection. The study conducted by Nagaraj, et al. on Knowledge and perception toward radiation protection protocols among dental students showed that the overall correct responses given by postgraduate students and interns were 80% and 65.5%, respectively, for the questions given to assess perception towards radiation protection.¹⁰ The study done by Eanbulele and Igbinedion on an assessment of Dental students' knowledge of radiation protection and practice in Benin showed that Knowledge of radiation protection was abysmally poor with a mean score of 0.92 ± 0.80 .¹² The study done by Vidal V et al. on Radiology as seen by medical students, a survey showed an acceptable level of awareness of radiation protection.¹³

In the present study knowledge on the use of a personal protective device for reducing radiation exposure was good for the use of lead apron (95.52%) and less for thyroid shields

(62.68%) as a protective device. The study done by Nagaraj et al. on Knowledge and perception toward radiation protection protocols among dental students showed that the majority of the participants used protective measures like a lead apron and lead barrier, but only 58% of PG students and 38% of interns used thyroid collars for their patients.¹⁰ Similar study conducted by Zope et al. among trainee dentists of Aurangabad found that their knowledge on radiation protection was satisfactory.¹⁴ In the present study sample size less and includes only 2nd-year MBBS students. Similar studies should be carried out on a large scale at the institutional and national level for better implementation of radiation protection protocols in the MBBS curriculum.

CONCLUSION

The students in the present study did have good knowledge of radiation hazards but show relatively poorer knowledge of radiation protection. This calls for more theoretical along with practical training of the undergraduate students for safety protocols and ethical practice in the field of radiation and protection. We recommend that the curriculum of MBBS in medical college be expanded further to provide better exposure to radiation protection and its practice so that these students on graduation will be well-grounded with the best principle of radiation protection. This in turn helps in the protection of the patients, operator and public from the harmful effects of radiation.

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Table 1: The socio-demographic distribution of the study subjects (N=134)

| Age (years) | No. of Students | Percentage |
|---------------------------|-----------------|------------|
| 19 | 41 | 30.59 |
| 20 | 49 | 36.56 |
| 21 and above | 44 | 32.83 |
| Place of residence | | |
| Kerala | 52 | 38.80 |
| Karnataka | 43 | 32.08 |
| Uttar Pradesh | 18 | 13.43 |
| Haryana | 10 | 7.46 |
| Other States | 11 | 8.2 |
| Religion | | |
| Hindu | 94 | 70.14 |
| Muslim | 15 | 11.19 |
| Christian | 25 | 18.65 |
| Sex | | |
| Male | 55 | 41.04 |
| Female | 79 | 58.96 |

Table 2: The knowledge on radiation hazards among study subjects (N=134)

| Responses to the questionnaire | |
|---|----------------------|
| Which of the following do you know as radiation hazards | Correct response (%) |
| Acute radiation sickness such as nausea and vomiting | 110 (82.05) |
| Skin injuries such as erythematic, skin pigmentation, dermatitis, hair loss and skin desquamation | 132 (98.50) |
| Cataract of the eye lens | 116 (86.56) |
| Bone marrow depression | 118 (88.05) |
| Infertility in men and women | 129 (96.26) |
| Congenital malformations in babies delivered by pregnant women exposed to ionizing radiations: | 133 (99.25) |
| Cancers such as skin cancer, leukaemia etc | 133 (99.25) |
| Death | 124 (92.53) |

Table 3: The knowledge on radiation protection among study subjects (N=134)

| Responses to the questionnaire | |
|--|----------------------|
| Which of the following do you know as a personal protective device for reducing radiation exposure | Correct response (%) |
| Lead goggles | 118(88.05) |
| Lead apron: | 128(95.52) |
| Lead gloves | 118(88.05) |
| Thyroid shield: | 84(62.68) |
| Gonad shields: | 74(55.22) |

Table 4: The scoring under knowledge on radiation hazards and protection of study subjects (N=134)

| Knowledge on radiation hazards | Poor | Above average | Good |
|-----------------------------------|--------|---------------|--------|
| | 6.71% | 14.92% | 78.35% |
| Knowledge on radiation protection | 21.64% | 29.85% | 48.50% |