



KNOWLEDGE AND AWARENESS OF RADIATION EXPOSURE AND RISKS ASSOCIATED WITH DIAGNOSTIC IMAGING MODALITIES AMONG MEDICAL STUDENTS

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ABSTRACT

Aim: This study examines the knowledge and awareness of radiation exposure which is associated with diagnostic imaging modalities among 102 medical students in an institute. **Objective:** To Evaluate the level of knowledge and awareness of radiation associated risks and safety principles. To Assess how education can be improved. To improve the safety measures and protect medical students from unnecessary radiation exposure.

Methodology:

Study Design- This is a hospital based cross sectional study.

Study Participants- Indian medical undergraduates, interns and junior residents.

Study Setting- konaseema institute of medical sciences and research foundation, Amalapuram. **Study Size** - 100 medical students including undergraduates, interns and junior residents. **Sampling Technique** - Convenience sampling. **Inclusion Criteria** - Medical undergraduate students, interns and junior residents of konaseema institute of medical sciences and research foundation. **Exclusion Criteria** - Students who are not willing to give the consent.

Data Collection Procedure - Data was collected through a online pre designed questionnaire.

Confidentiality - Particulars and details of all participants was kept confidential throughout the study. Only summary of the details was used for declaring the result. **Ethical Consideration** - Institutional ethics committee approval was taken and informed consent was obtained. **Survey:** Awareness, knowledge about ionising radiation and associated risks were assessed using a questionnaire tool. In this questionnaire, the students were asked whether they had received any lectures about ionising radiation during their program of study and to what degree these lectures had focused on radiation exposure and risks associated with various diagnostic modalities and the safety measures that has to be taken while exposure and how important is what they felt about ionising radiation, as it relates to radiological investigations. **Review Of Literature:** A hospital-based cross-sectional study was conducted by Seife Teferi Dellie, in Addis Ababa University, College of Health Science, Addis Ababa, where there are medical students from the first year to the final year including their internship program. Aim is to assess the level of knowledge about the radiation exposure to diagnostic imaging procedures among the final-year medical students and interns and to suggest how education could be improved. 245 (71.4%) and 254 (79.3%) incorrectly believed that ultrasound and MRI, respectively, emit ionizing radiation or they do not know if they emit radiation or not. Awareness did not increase with seniority; there was no significant difference between interns and medical students ($P = 0.56$). It is alarming that 14.9% of participants believed that such knowledge was either "not really important" or "not important at all" or "they do not know if it is important or not." This group scored significantly lower than those who believed that radiation knowledge was "moderately important" or "very important" ($P = 0.002$). In terms of radiation awareness, 34.8% of respondents acknowledged that they had some form of education on ionizing radiation previously in the form of lectures (21.3%), tutorials/workshops (7.3%), or a combination of these 5.2%. If the respondents were to have a choice in the format of education for further radiation awareness, they answered that a combination of tutorials or workshops (29.7%) and learning modules (19.8%) would be their first and last choices, respectively. [10] Another observational cross-sectional survey targeting female final-year medical students and interns at King Khalid University, Abha, Saudi Arabia. conducted by Abrar Abdu Mohammed¹. The aim of the study is to evaluate the level of medical students' and intern doctors' awareness of ionizing radiation exposure doses during common radiological procedures. An online link to a brief survey was sent to the participants through social media groups, in which they study and discuss study-related topics. The survey consisted of 5 questions on Students' socio-demographic data and their understanding and perceived importance of knowledge about radiation, 16 questions evaluating their knowledge on ionizing radiation doses, and 2 questions on their preferred method of learning on the study subject. The total mean score of knowledge about estimated radiation exposure ranged from 0 to 9, with higher scores indicating greater knowledge. Eighty-seven students responded to the survey, 48 (55.2%) were final-year medical students and 39 (44.8%) were intern doctors. Their mean age was 23.7 years (SD 1.13 years). Overall, the mean score of knowledge about estimated radiation exposure of commonly used radiological imaging modalities was 0.71. A significant difference was found in the year of study, with intern doctors scored higher than final-year medical students ($p = 0.04$). Regarding age, students aged 24 years or older scored higher, but not significantly, than younger ($p = 0.08$). No significant difference in knowledge was found regarding students' confidence with knowledge about Ionizing Radiations (IR) ($p = 0.17$) and students. Perceived importance of IR ($p = 0.73$). Overall, these results suggest that students in this sample had low level of knowledge about estimated radiation exposure of commonly used radiological imaging modalities. When asked about previous education of ionizing radiation, 41.4% of the respondents reported that they had no such knowledge. The majority (40.2%) preferred Tutorials/workshops as educational methods for future learning about ionizing radiation, followed by lectures (29.9), case studies (18.4%), and learning modules (11.5%). [11]

KEYWORDS :

INTRODUCTION

Nowadays, medical imaging procedures involving the use of ionizing radiation are used daily in hospitals and clinics, making possible more accurate diagnosis of diseases and injuries. However the use of ionizing radiation such as X-rays etc is also associated with potentially harmful biological effects specifically; high radiation doses tend to kill cells,

while low doses tend to damage or alter DNA of irradiated cells [1,2]. The risk of radiation exposure from medical imaging is not insignificant; it is now believed that a linear relationship exists between radiation exposure and cancer development. In recent times many studies have clearly documented the harmful effects of radiation exposure [3-7].

Many studies indicate that medical students are not

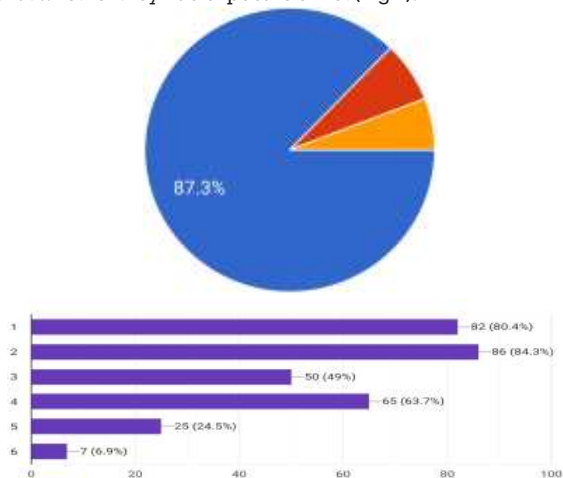
adequately aware of the hazards associated with the use of radiation. In a research done in Pakistan, the majority of medical students have limited knowledge about various aspects of radiation sources, the risk involved, and protection[8]. The significance of the study is to analyse the need for formal education on radiation exposure and protection and ensure safety of medical students regarding ionizing radiation relevant to medical imaging.

RESULTS

A total of 102 medical students completed the online questionnaire of which 77 % of students are of age group 18-24 years, 22% of students are of age group 25-30 years and 3 % are of < 18 years.

Among them 52.9 % individuals are male and 47.1% individuals are female.

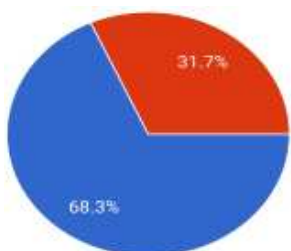
The following are the results that were obtained from the data collected through the survey .In a clinical setting 87.3% individuals had radiation exposure and 6.9 % individuals are not exposed to radiation and 5.9% individuals are not sure that whether they had exposure or not (Fig 1).



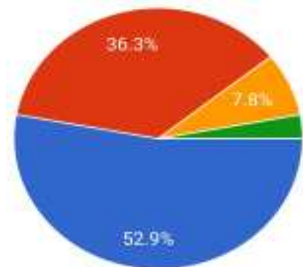
Most of the students had radiation exposure in orthopaedic department like operation theatres and all where c-arm is used which contributes 84.3% of radiation.

The second most department where students had radiation exposure is radiology which is about 80.4% then followed by surgery which is about 63.7% and then cardiology which is 49%. The least exposure is in nuclear medicine which was about 24.5% and from other remaining department contributes 6.9% of radiation exposure among students(Fig 2).

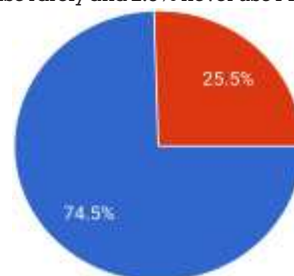
68.3% students responded that their institution were following strict radiation safety guidelines and 31.7% students responded that their institute not following strict safety guidelines.



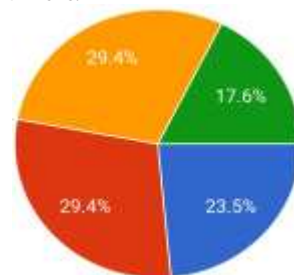
29.4% students revealed that they sometimes stand in direct path of radiation during procedures and another 29.4% revealed they rarely had and 23.5% students always stand in direct path of exposure and remaining 17.6% students never had direct exposure.



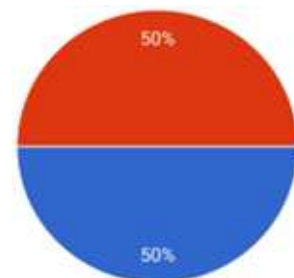
52.9% students always use personal protective equipment (PPE) like lead aprons , thyroid shield in Radiology rooms or procedure rooms and 36.3% students use at times only and 7.8% students use rarely and 2.9% never use PPE



Among the 102 students 74.5% students are aware of the potential health risks associated with radiation exposure and the remaining 25.5% individuals are not aware of the associated health risks.



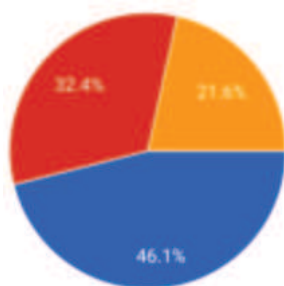
Among the total students only 50% students have received formal education on radiation exposure and the remaining 50% students haven't received any formal lectures or education.



Among the 102 students 91.2% students answered correct that X rays uses ionizing radiation and 89.2% individuals answered correct marking CT scan also uses ionizing radiation and only 67.6% students among 102 individuals know that fluoroscopy also uses ionizing radiation and 67.6 % students also marked correct that PET scan also uses ionizing radiation.8.8% individuals marked that MRI and 7.8% marked that ultrasound also uses ionizing radiation.



46.1% students believe that they received sufficient education on radiation safety measures and 32.4% students think that they haven't. 21.6% students are not sure whether they had received sufficient knowledge or not.



Among the 102 students 92.2% students think that using shields like lead apron, thyroid shield are the most effective ways to reduce radiation exposure (Fig 2).



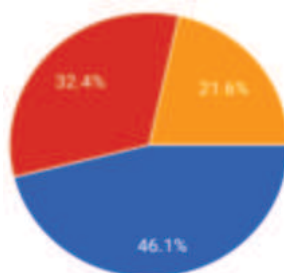
82.4% students think stepping out of the room during procedures when they are not involved is effective as per their knowledge.

47.1% individuals think increasing distance or staying away from radiation sources is effective way to avoid exposure.

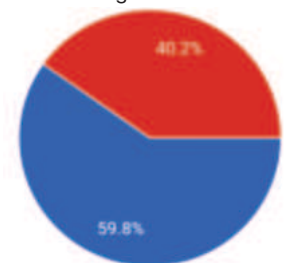
45.1% students think wearing dosimeters is advantageous for exposure monitoring.

44.1% students think reducing the time spent near radiation sources is effective. (Fig 3)

Fig3.



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Out of 102 individuals, 59.8% individuals feel that medical students are adequately protected against radiation exposure in their institution and remaining 40.2% feel that they are not adequately protected against radiation.

DISCUSSION

From the survey, we came to know that 84.3% students out of

100% had radiation exposure in department of orthopaedics as they use c-arms in operation theatres and also by means of x rays. Among the sample taken which was 100%, only 50% students had attended formal lectures and the remaining 50% students had not, which is of great concern, as it was mandatory for a medical student. It is the reason for highest exposure rate which is about 87.3% and 29.4% students within them had direct exposure sometimes.

This is the reason why formal education on radiation exposure and safety is must, as it would have lessened the direct exposure rate. Among the 102 students, only 74.5% students are aware of the potential health risks associated with radiation exposure and the rest of 25.5% individuals are not aware. Only 46.1% students believe that they have received adequate education on radiation safety. Only 68.3% students responded that their institute is following strict radiation safety guidelines and the remaining 31.7% responded their institute is not following strict safety guidelines. 8.8% and 7.8% of the respondents thought incorrectly that MRI and Ultrasound emit ionizing radiation respectively. Out of 100%, 67.6% and 67.6% students only know that fluoroscopy and PET scan also emit ionizing radiation respectively. 91.2% students know that x ray use ionizing radiation and 89.2% students know that CT scan also uses ionizing radiation. 59.8% respondents feel that they are adequately protected against radiation exposure in their institute. 52.9% students always use Personal Protective Equipment (PPE) when they had exposure as only these percentage of students had PPE availability at their institutes and they had enough knowledge about the associated risks of ionizing radiation.

These are some of the safety measures which students thought effective in reducing radiation exposure. Using personal protective equipments like shields, voted by 92.2% students stepping out of the procedure room when they are not involved, voted by 82.4% students increasing distance or staying away from radiation sources, responded by 47.1% students wearing dosimeters for exposure monitoring, responded by 45.1% students reducing the time spent near radiation sources, responded by 44.1%. The key finding of the present study is that students not have adequate knowledge about ionising radiation and its exposure.

The results support the hypothesis that medical students are not adequately aware of radiation of radiation and its associated risks for commonly performed diagnostic imaging procedures. In a similar survey done in Northern Ireland among health professionals on awareness of radiation dose, it was confirmed that clinician awareness of radiation doses imparted during common radiological procedures and the consequent risk is poor. [9]

Another research done in Australia among doctors working in the emergency department assessed emergency doctors knowledge of radiation exposure for medical imaging and it was found to be poor. [9] Certain measures has to be taken and improvements has to be done in institutes to reduce radiation exposure to the medical students.

CONCLUSION

The conclusion of the study is that the medical students are not adequately aware of the potential risks associated with radiation exposure. There is a need to educate medical students about ionizing radiation relevant to medical imaging. This can be achieved by indulging formal education about radiation exposure in the medical curriculum and by conducting various work shops and also by initiating the awareness programmes regarding safety guidelines and protection in order to bring awareness among medical students. The risk of ionizing radiation from medical imaging is not insignificant. It is now believed that a linear relationship exists between radiation exposure and cancer development.

The study highlights that medical students does not have adequate knowledge and awareness of radiation exposure and risks associated with diagnostic imaging modalities. Although the absolute risk to an individual may be small, exposure of large numbers of people over time and repeated exposure may lead to a significant increase in cancer cases. The results of this current research emphasize the need for further education of present and future doctors, improvement and strict safety guidelines at institutes must be followed.

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