

# Assessment of Knowledge and Awareness about Basics of Radiation and Safety Measures among Allied Health Science Professionals Including Radiographers and Students of Radiology and Imaging Technology: University Based Study

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## ABSTRACT

**Aim & Objective-**This study has been undertaken to assess the knowledge and awareness about basics of radiation and safety measures in diagnostic radiology among allied health professionals including, Radiographers, and students of Radiology and imaging technology.

**Materials and Methods:** A questionnaire based survey was performed to collect data of knowledge about the radiation awareness and safety measures using in diagnostic radiology, among allied health professionals including radiographers, and students of Radiology and imaging technology.

**Result-** Knowledge about principle of radiation protection was very disappointing, because 30.60% of the participants know the basic principle of radiation protection (Justification, Optimization, and Dose Limit). 43.40% participants said that, ALARA is the basic principle of radiation protection while 26% participants said that, TDS (Time, Distance and Shielding) is the basic principle of radiation protection.

**Discussion-**Majority of participants needs to improve their knowledge about the radiation awareness and safety measure.

**Keywords:** Radiation, Safety, Protection, Radiation awareness.

## INTRODUCTION

Radiation plays a massive role in the current health care system. Technical advancement in the medicine leads to increase the radiation exposure to general public with artificial source of radiation [1]. With advancement of technology in the field of science as well medicine after accidentally discovery of X ray by sir Wilhelm Conrad Roentgen in 1895, the use of ionizing radiation in the field of radiology has been rapidly increasing, which is attributable to current technology in the medical imaging, that are promising to solve the variety of clinical problems [2]. Ionizing radiation from medical use and applications leads to majority of the radiation doses from artificial or manmade sources to which the general public is exposed [3]. Most of the medical imaging procedures including, routine radiography angiography, fluoroscopy, computed tomography (CT) etc. utilize ionizing radiation to create a good quality of radiographic image. In some investigation such as several CT procedures and intervention procedures the threshold level may be exceeded as permitted by the competent authorities [4]. Thus it's very important to know about the radiation, their

source, hazardous effect etc. when we use it safely with proper manner, it is the safest branch of medicine while we breach the recommended guidelines in term of safety precautions and ALARA principle then it can cause the biological effect to the people. Insufficient knowledge about the radiation prevention and their dose limits among the healthcare professional blaming the radiation related issues [5],[6],[7]. Inadequate knowledge about the radiation risk associated with radiation dose leads to biological effect of radiation [8]. Referring physicians must know about radiation, what are their benefits! Risk! etc., because they are the ones who ordering or referring the patients for radiological tests. However, the radiology professionals including doctors, technologist has the important task to deciding the required study for an individual patient and to discuss the difference in opinion and disagreements, if required, with the referring physician and the patient [9].

#### **Purpose (s) of the study:**

To assess the knowledge and awareness about basics of radiation and safety measures among allied health professionals including radiographers and students of radiology and imaging Technology.

#### **MATERIALS AND METHODS**

A questionnaire based survey was performed to collect data of knowledge about the radiation awareness and safety measures using in diagnostic radiology, among allied health professionals including radiographers, and students of Radiology and imaging technology. Questionnaire includes four sections, in which section first was the demographic details such as age, gender, academic qualification, and work experience. Section second included 9 MCQ related to source of radiation, radiation protection principle, harmful radiation etc. Section third and fourth included radiation protection authority guidelines and overall satisfaction level of participants. The participants from multiple universities of North East were involved in this study.

Total 465 candidates were participated in this study, in which 450 was submitted the response. Total time was 45 minute was given to the participants to complete the study. Clear instruction has to be given to all participants in order to prevent any kind of duplications, do not answer the questionnaire if they had already filled previously. All questions of each and every section in a multiple choice format with four options with one correct answer. The data were collected from 26<sup>th</sup> March 2022 to 11<sup>th</sup> April 2022. All data were collected on Google form based (online) along-with consent form approved by department of Allied Health Science, Brainware University, Barasat West Bengal, India. Each correct answer was assigned with one mark. There was no negative marking for incorrect answer. Statistical analyses were performed using excel software. All data/responds received from online questionnaire, put manually in the excel software and analyses the results using pie and bar chart.

#### **RESULTS**

A total number of received responses out of 465 were 450 in this study including UG Students of RIT, PG Students of RIT, and Radiographers.

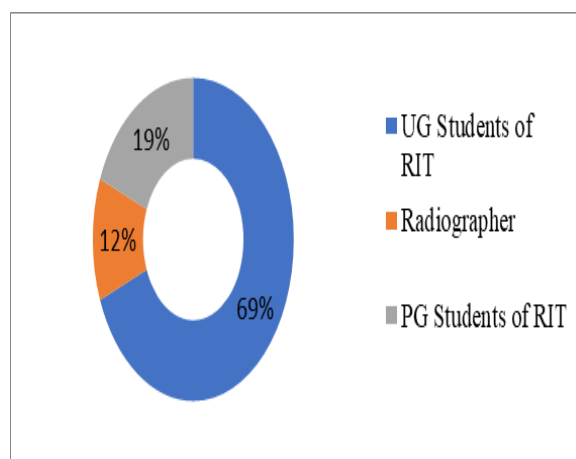


Fig-1 Showing the percentage of participants in this study.

410 out of 450 replies correct answer about source of radiation. 345 out of 450 participants were aware about the maximum percentage of radiation comes from

different source either natural or man-made. About the regulatory body to regulate the different guidelines in the Radiology Department, 325 out of 450 were replied correct information. Knowledge about principle of radiation protection was very disappointing, because 30.60% of the participants know the basic principle of radiation protection (Justification, Optimization, and Dose Limit). 43.40% participants said that, ALARA is the basic principle of radiation protection while 26% participants said that, TDS (Time, Distance and Shielding) is the basic principle of radiation protection.

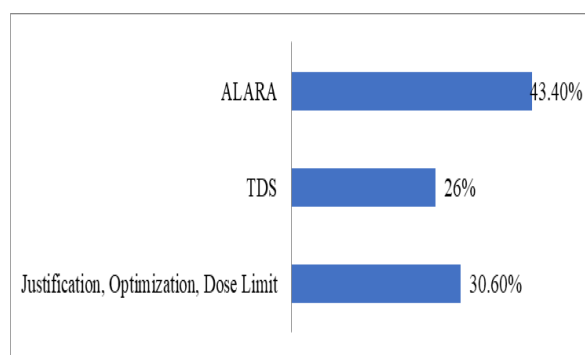


Fig-2 Showing the knowledge about principle of radiation protection.

Knowledge about different types of radiation was very poor, only 45.4% participants know about the different types of radiation (Alfa/beta, beta/gamma, electromagnetic/particulate, x-ray/gamma). Regarding the harmful effect of the radiation, 81.1% were aware that, ionizing radiation is more harmful than non-ionizing. Most of the participants know the regulatory guidelines and ALARA principle in this study. The assessment of knowledge of basic principle of radiation protection yielded disappointing results with 30.6%. Appreciation results regarding contrast investigation in the radiology department, 97.4% participants know that, consent form is mandatory.

## DISCUSSION

The main aims and objective of this study to evaluate the knowledge and awareness level of the radiological professionals, who are

working and studying in the radiation zone directly or indirectly. Advancement of the technology in the medical science, increase the use of variety of modalities in the medicine for the diagnostic as well as therapeutic purpose. Ionizing radiation may cause harmful effect to the human population, if they handled improperly; otherwise, there is no harmful effect of radiation. Therefore, this is very important to know about the basics of radiation including physics of radiation, applications of radiation in medicine, and awareness about health hazards. There is different source of radiation, natural as well as artificial (man-made). Maximum percentage of radiation received from natural source, only 18 percent of radiation received from the artificial source. In this study, only 39.8% participants were aware about the source of radiation. This is not good representation of knowledge, because as radiology professional we have to know about basics of radiation such as source, harmful effect, and types of radiation protection principle etc. lack of this basic knowledge may leads to unwanted radiation dose to the patients as well as him/her also. Overall satisfaction level of the professionals in the radiology department yielded disappointing, 16.8% gave the satisfaction score 10/10, 21.9% participants gave the score 9/10, 25.5% of participants gave 8/10, 16.8% of participants gave 7/10 score. Some suggestion also comes from the participant's side including radiation dose and equipment's related query. We can further improve the awareness and teaching methodology in the radiology field. It should be more theoretical as well as practical oriented to enhance the skill and knowledge the radiology professionals. This is also very important to radiology students as well as faculty to discuss about the basics of radiations such as source of radiation, radiation protection principle, biological effect of radiation etc. in details, it enhances the knowledge of radiology students as well as radiology professionals also. It is alarming that, the knowledge about basics

of radiation and safety measures need to improve for smooth practice in diagnostic radiology.

The collected data provided an interesting information on their knowledge, experience and satisfaction level of medical professionals in the radiology department. Most of the populations in the study show average knowledge of the full spectrum of awareness of ionizing radiation effects.

## CONCLUSION

The evaluation of radiation safety knowledge and awareness among radiology professionals including radiology workers and radiology students was completed successfully. The study revealed relationships between their qualification levels, with radiation protection awareness. It also found correlations between basics of radiation to satisfaction level in the radiology field. Lower level of knowledge was associated with awareness of radiation protection measures. Finally we have to focus the more research based study including theoretical as well practical also.

## Limitations of this study

This study is only a small population based with small sample size. As this was an observational study, this is limited to clinical investigations.

## Acknowledgements

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