IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

A DESCRIPTIVE STUDY TO ASSESS THE KNOWLEDGE AMONG RADIOLOGY STUDENTS OF JAMIA HAMDARD REGARDING RADIATION PROTECTION DEVICES, THEIR USES, AND HANDLING.

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Abstract:

PURPOSE: The study was conducted among Medical Imaging Technology students of Jamia Hamdard (Deemed to be University) regarding radiation protection devices, their uses, and handling.

DESIGN: The cross-sectional survey was carried out with use of observational descriptive approach design.

METHODS: A questionnaire-based study was carried out in the department of paramedical sciences among students of Medical Imaging Technology. A standardized, semi-structured, questionnaire was prepared, validated, and circulated among a population of 150 (undergraduate, postgraduate, and diploma) students. Data was recorded and statistical analysis was done using Microsoft Excel 2019.

RESULTS: One hundred fifty (150) participants were taking part in this study out of which 100(66.7%) were undergraduates, 38(25.3%) were postgraduates and 12(8%) were diploma students of Medical Imaging Technology. There were 85(56.7%) males and 65(43.3%) females and their level of knowledge about radiation protection devices, their uses, and, handling were found to be good. Majority of the population i.e.; 37.3% had excellent knowledge, 34.7% had good knowledge and 28% had poor knowledge regarding radiation protection devices. Most of the participants have good knowledge about radiation protection devices but some of the students have less knowledge about the thickness of lead disc (23.3%) had selected the correct option, when asked about the recommended period of OSLD badge (36.1%), types of TLD badge (38.7%) and cardinal principles of radiation protection (32.7%). There is a need for further awareness and knowledge about these important aspects.it is also important that the persons working in the imaging department should know the radiation protection principle and different guidelines issued from time to time by international and national organizations like ICRP, AERB, NCRP, etc. for safe operations.

CONCLUSION: This study concluded that most of the respondents show a good knowledge of radiation hazards, radiation protection, and safety, despite poor radiation protection practices, but still radiation exposure and prevalence of abnormal clinical conditions were found to be below. Therefore, there is a need for periodic training and theoretical sessions. It is also important to update the students and radiology technologists about new techniques and development to decrease the radiation risks and accidents. From this study, we suggest that all members of the health care community should attend the seminars, guest lectures, or other feasible methods so the persons associated with the medical imaging technology would use these types of radiation protection devices for safe operations.it is also the responsibility of radiology students as well as technologists to work under guidelines issued by different national and international organizations to make a safer environment for imaging.

Index Terms **- ionizing radiation, Radiation protection devices, Radiology students, Knowledge, Nuclear medicine imaging, Safety, Medical Imaging Technology.**

I. INTRODUCTION

The x-ray was discovered by Wilhelm Conrad Roentgen on November 8, 1895. Roentgen was working in his physics laboratory at Wurzburg University in Germany. X-rays were not developed; they were discovered, and quite by accident. (1)

Radiation is a shape of power that comes from a source, that may travel from one region to any other in a vacuum at the velocity of mild i.e., with no medium. Ionization is a technique of elimination of electrons from an impartial atom. The radiation which does ionization in a medium, through the elimination of electrons known as ionizing radiation, e.g., UV, X-rays, and gamma rays has enough power to do ionization. As a result, ionized atoms and molecules or ion-pairs are produced. This paperwork is the premise for organic results of radiation. Radiation that does not have enough strength to supply ionization is referred to as non-ionizing radiation, e.g., seen light, infrared, radio waves, and TV broadcasts. (2)

It is a vital part of fitness care analysis and interventional. Ionizing radiation is applied in interventional fluoroscopy, CT, etc. Approximately every year, extra than two thousand five hundred million diagnostic radiology examinations, 5.5 hundred of thousand radiotherapies, and 32 million nuclear remedy consultations are achieved worldwide. There may be a damaging end result at low doses of ionizing radiation. (3)

In the case of diagnostic tubes running at one hundred fifty kV and above, the manipulate panel must be positioned in a separate room and the technician have to function himself in aspect the managed room each time the tube is energized. In the case of diagnostic tubes working at one hundred kV, the manipulated panel has to be placed both in a separate room or at the back of a cellular protecting barrier of 1.5 mm. lead equivalence or a partition wall with a viewing window of the lead glass of 1.5 mm lead equivalence as a long way away as feasible however now no longer much less 2 meters from the tube. The technician has to roll himself/herself in the back of the protecting shielding. If the unit is positioned in a separate room the way of verbal exchange among the affected person and operator on the manage panel ought to be provided. In the case of radiography, the vertical cassette holder, (chest stand) must have a backing of a minimum of 1.5 mm thick lead. The dose to gonads of the sufferers has to be decreased by way of means of the usage of gonadal shields bucky has to be included with the aid of using a few kinds of protective gadgets having lead equivalence of now no longer much less than 0.5 mm. Radiation safety gadgets are utilized in the radiology branch to protect humans from the risky consequences of radiation. Because ionizing radiation causes a maximum of the dangerous results like cataracts, pores, and skin erythematic, organ atrophy and most cancer, etc. Radiation protection devices are; a lead apron, thyroid shield, gonadal shield, lead goggles, and lead gloves. All the persons working in the radiology department should wear the personal or required protective devices, while the unit is operated or performing any examination and it is the responsibility of the technologist to protect the patient from the ionizing radiation. For the physician, affected persons, and body of workers in lots of branches including radiology, surgery, and interventional cardiology, Digital Substruction Angiography radiation protection is a concern. During the fluoroscopic process, radiation is emitted that is accountable for the best radiation dose for the clinical body of workers. Because maximum ionizing radiation publicity in scientific placing arises from fluoroscopic imaging, which makes use of x-rays to acquire dynamic imaging. During x-ray publicity, all groups, of radiation workers in the radiographic room stand at the back of the cellular defensive barrier or use employee shielding gadgets like a lead apron which cowl the frame part. The entire defensive barrier is not always much less than 0.25 mm of lead equal. While status with inside the number one beam the employees shielding gadgets thickness is 0.5-0.25 mm for scattered radiation worker, that now no longer status at the number one beam has required at least 0.25 mm of the lead equal shield. (4)

Numerous researches have proven that radiation publicity may be decreased via safety strategies with the following three categories: personal protective equipment (PPE) utilized by individuals, right operation of C-arm fluoroscopy, and safety devices connected to the running desk or x-ray tube. Although it might be perfect to apply those defensive devices simultaneously, maximum hospitals no longer have most of these defensive gadgets in real scientific settings. Aside from being inconvenient at some point in procedures, it's miles much less powerful to apply them all simultaneously. Therefore, many physicians use an aggregate of those defensive gadgets. However, due to the shortage of hints concerning their use, problems persist at the same time as selecting a mixture of protective gadgets.

Although there are numerous researches concerning the performance of every defensive tool for decreasing the dose of radiation publicity to a physician no look at has in comparison the protecting impact of those devices while utilized in the mixture at some stages in spinal interventional procedures. Therefore, the intention of this look was to decide the maximum green mixture of protective equipment without decreasing the producing potential of the x-ray tube and interfering with interventional procedures. (5,6,7)

Shielding

- ❖ Use an appropriate shielding material or protection devices.
- ❖ Radiation protection devices reduce exposure rate.
- ❖ Use large shielding thickness (High Z material e.g., lead, steel, concrete, etc.) to reduce the exposure rate of gamma/ x-ray radiation. (18)

fig 1: showing the proper way to use radiation protection devices. (20)

Care and use of radiation safety devices

Care of radiation protection devices has to preserve the lead integrity. Dropping, Pulling, often falling down, and wrongfully storing can fracture the internal layer of lead, and affect protection and integrity capacity therefore right checking and garage is needed for its right make use of radiation safety devices must be checked as a minimum on an annual foundation for his or her protecting integrity. (8)

fig 2: indicates the right way to store the lead apron on hangers/racks. [21]

Downloaded High Resolution image from google chrome (AFC industries)

Storage of the radiation protection devices

Lead apron, thyroid shield, gonad defend, aspect defend, radiation reducing gloves and any other protection tool might be each saved on hangers or flat in nicely designed racks or to inhibit flaws at the side of internal cracks. The inner cracks with inside the lead lining can expand on the folds, decreasing the beneficial existence of the devices.

Any objects showing ruin with inside the lead lining need to be replaced. A Pb apron may get modified if flaw is greater than 15 mm^2 in regions near important organs. May be thyroid protect additionally need to be replaced if flaw is more than 11 mm^2. [9]

FIG 3: Photograph showing defects in protective apparel [10]

The lead apron also plays an important role in Nuclear Medicine Imaging, gamma emitters have the most utility among radionuclides or radiotracers or radiopharmaceuticals, or isotopes in nuclear medicine. Concerns have been raised over the safety of gamma radiation. As quickly as a radionuclide is introduced to a patient, the patient will be transformed into a risky supply of ionizing radiation for everyone, especially nuclear medicine personnel. Studies have revealed that the maximum dose associated with cancers and genetic consequences has been collected through nuclear medicine personnel. The personnel want to reduce their exposure by increasing their distance from the radiation source and the use of lead aprons. The use of lead garments is actually selective as it does now no longer yield equal defensive impact for numerous radionuclides. However, it seems that the usage of lead aprons is the most important step in the implementation of As Low as Reasonably Achievable (ALARA) policy. According to ALARA, all defensive movements must be implemented to reduce radiation exposure and protect the Nuclear Medicine personnel as well as the patients. Currently, protective lead aprons with Pb thickness of 0.25 to 0.5 mm are provided [19].

It is suggested that the faulty apron near the essential organ get replaced and people in regions distal from the crucial organs be in addition evaluated the use of the rejection standards check earlier than they are replaced. Right approaches to dealing with lead apron have to be advocated when you consider that there are no bodily methods to examine tear or crack besides using an x-ray. [11]

Personal protection equipment became utilized by 90% and radiation tracking devices by handiest 36%. Appropriate defensive devices and tracking devices are now no longer to be had in maximum installations. [12]

There ought to be right principal training for the conduction of information about radiation safety devices, their use, and management in a radiology department. Training consultation and coaching requirements have to be considered. Accordingly, they have a look indicating that all individuals of the health care network have to attend the webinars, visitors' lectures, and education periods approximately expertise of radiation safety devices, their use, and coping with in the radiology department. [8]

A large percentage of the body of workers turn to ignorant of the lead equivalence, material, and kinds of lead aprons available, after education this improvement; 92% of personnel now suppose extra cautiously while selecting a lead apron. The study concludes that backache is general amongst a group of workers the usage of lead aprons and a loss of education concerning their use is evident. This should bring about time without paintings and result in dangerous practices around ionizing radiation. [13]

it is far viable that a devoted and particularly designed lead protector should reduce fetal dose extra successfully at the same time as additionally decreasing the affected person's discomfort. Measurements have been additionally finished with the physical model to confirm simulation outcomes, simulation consequences confirmed that the attention lens doses have been decreased through a component from three to nine while carrying a 20 cm^2 sized lead glasses with the equal thickness starting from 0.1 to 1.0 mm Pb. The increase of dose reduction factor (DRF) changed into now no longer huge on every occasion increasing the lead equal of glasses which are larger than 0.35 mm. Furthermore, the DRF turned into the scale of glass lens from 6 to 30 cm^2 with the identical lead equal. The simulation outcomes had been in proper agreement with the measured ones. For greater affordable and powerful safety of the attention lens of interventional radiologists, a couple of glasses with a lead equal to 0.5 mm Pb and a large-sized (as a minimum 27 cm^2 in line with glass) lens are recommended. [14,15]

Training the fine certified radiographers is the important thing to correct the positioning of the shield in male subjects. it is concluded that the 0.25 mm lead equivalent thick aprons and 0.35 mm lead aprons are powerful for interventional radiology operators and computed tomography nurses, respectively. [16,17]

II. NEED OF THE STUDY

- ❖ Research data depicting an increase in radiation exposure due to lack of knowledge regarding radiation protection devices, their uses, and handling which prompted me to undertake this cross-sectional study.
- ❖ This study will help to generate awareness among radiology students so as to minimize the radiation dose and save themselves from these harmful effects of radiation.

III. OBJECTIVES OF THE STUDY

- ❖ To assess the level of knowledge among radiology students regarding radiation protection devices, their uses, and handling.
- ❖ To compare the knowledge of students on the basis of their clinical experience.

IV. ASSUMPTIONS OF THE STUDY

- ❖ The radiology students are knowledgeable or well aware of radiation protection devices and their uses.

- ❖ Radiology students are well aware of the safe handling of radiation protection devices.
- ❖ Students will answer honestly and objectively.
- ❖ Radiology students know how to use radiation protection devices during any type of radiographic investigation.

V. OPERATIONAL DEFINITIONS

- ❖ **Knowledge:** in this study knowledge of radiology students included:

  Use of radiation protection devices, their use, and handling in a proper manner.
- ❖ **Radiation:** in this study, radiation included: How the radiology students protect themselves from this harmful radiation while using these radiation protection devices.
- ❖ **Radiology Department:** In this study radiology department included: students who are doing under graduation, postgraduation degrees, and diplomas in the same field.
- ❖ **Radiation Protection Devices:** In this study, radiation protection devices included: a lead apron, lead gloves, lead glasses, thyroid shield, gonadal shield, and lead barrier.
- ❖ **Handling:** In this study handling of radiation protection devices included: How radiology students hold or grip these radiation protection devices while used.

VI. METHODOLOGY

- ❖ **Research Design**

  cross-sectional design.
- ❖ **Research Approach**

  Observational descriptive Approach Design
- ❖ **Research Setting**

  Department of Paramedical Sciences, SNSAH, Jamia Hamdard (Deemed to be University), New Delhi.
- ❖ **Population**

  Paramedical Students pursuing Radiology Courses (undergraduate, postgraduate, and diploma) in Medical Imaging Technology, Jamia Hamdard (Deemed to be University) New Delhi.
- ❖ **Sample Size**

  150 subjects.
- ❖ **Sampling Technique**

  Convenience Sampling Technique.
- ❖ **Statistical Method**

  Descriptive Statistical Method.
- ❖ **Tools For Data Collection**

  Self-structured questionnaire

VII. SAMPLING CRITERIA

- **Inclusion Criteria**
  - ❖ Paramedical students, who are pursuing Radiology Courses in SNSAH, Jamia Hamdard (Deemed to be University), New Delhi, are Willing to participate in this Survey.
  - ❖ Willing to participate in the survey.
  - ❖ The confidentiality of students is maintained.
- **Exclusion Criteria**
  - ❖ Paramedical students who are not willing to participate in Radiation Protection Devices Survey.
  - ❖ Students from other Courses.
  - ❖ Paramedical Faculty Members.

VIII. METHOD

The questionnaire-based survey entitled **"A DESCRIPTIVE STUDY TO ASSESS THE KNOWLEDGE AMONG RADIOLOGY STUDENTS OF JAMIA HAMDARD REGARDING RADIATION PROTECTION DEVICES, THEIR USES, AND HANDLING,"** was conducted among the medical imaging technology students of Jamia Hamdard (Deemed to be a university) regarding the radiation protection device, their uses, and handling. The questionnaire was self-structured, and was validated from three experts and then was examined and approved by the ETHICAL committee of JAMIA HAMDARD (Deemed to be University) related to the radiation protection devices, their uses, and handling in multiple choices were shared with the students through an online platform (google form) and responses were collected from 150 participants. The participants involved in the study were the students with diplomas, bachelor's, and masters in medical imaging technology. The questions of the questionnaire were divided into two sections.

1. The first section of the questions was related to the sociodemographic characteristics
2. The 2nd section of the questions was related to the knowledge regarding radiation protection devices, their uses, and handling. The details of the questionnaire are shown in Table 1.

table 1 questionnaire questions and answers

Questions	Answers
1. Gender	a) Male b) Female c) Other
2. Age (in years)	a) 19-22 b) 23-26 c) 27-30 d) 30 above
3. Occupation	a) Student b) Internee
4. Course	a) Diploma b) Undergraduate c) Postgraduate
5. Academic year	a) Ist year b) 2nd year c) 3rd year d) Internee
6. Clinical experience	a) 1-6 months b) 7-12 months c) 1-3 years d) No clinical experience
7. Clinically posted in	a) X-ray b) CT scan c) MRI d) None
8. Hospital type	a) Government b) Semi-Government c) Private d) None
9. Which all are known as cardinal principles of radiation protection?	a) TLD b) TDS c) OSL d) All of above
10. Which of the following is fundamental to radiation protection?	a) Justification b) Optimization c) Limitation d) All of above
11. ICRP stands for?	a) International Commission on Radiotherapy Practice b) International Commission on Radiological Protection c) International Council for Radiation Procedures d) International Council of Radio Waves Prevention

12.	Radiation protection shields are made up of?	a) Copper b) Silver c) Lead d) Tin
13.	Radiation exposure occurs in all except?	a) CT Scan b) Plain X-Ray c) Fluoroscopy d) MRI
14.	Full form of ALARA is	a) As large as readable acceptable b) As low as reasonably achievable c) As low as radiation available d) None of the above
15.	If the lead apron is used, then at which place the film badge is worn?	a) Under the lead apron b) Over the lead apron c) Both (a) and (b) d) No need to wear
16.	The lead apron must have a lead equal thickness of	a) 0.5 mm b) 2 mm c) 3mm d) None of the above
17.	To protect the patient's reproductive organs, which of the following method will be used	a) Distance b) Inverse Square Law c) Room Shielding d) Gonadal Shielding
18.	The lead equivalent thickness of the glass viewing window of the control panel is	a) 2.0 mm b) 1.5 mm c) 3.0 mm d) 1.0 mm
19.	In the radiology department, walls are coated with which of the following	a) Glass b) Tungsten c) Lead d) Iron
20.	Full form of TLD is	a) Thermolight Dosimeter b) Thin Light Dosimeter c) Thermoluminescence Dosimeter d) Top Light Detector
21.	There are how many discs in a TLD	a) One b) Two c) Three d) Four
22.	How many types of TLD badges are available?	a) Three types (Chest, Wrist and Head) b) Two types (Chest and Head) c) One type (Only Chest) d) None of the above
23.	In diagnostic radiology, right position to wear a TLD on body is:	a) On Chest level b) On Head level c) On Waist level d) None of the above
24.	Thickness of TLD disc is	a) 0.8 mm b) 0.5 mm c) 1 mm d) 2 mm
25.	TLD badge is used for?	a) Personnel dose monitoring b) Radiographic film exposure c) X-Ray tube efficiency d) Patient dose measurement
26.	In OSL dosimeter, OSL stands for	a) Orbiting Solar Laboratory b) Open Software License c) On-Site Laboratory d) Optically Stimulated Luminescence
27.	How is OSLD readout:	a) By Heating b) By QR Code Reader c) By Laser Light d) All of the above
28.	What is recommended period to wear an OSL badge	a) 2 Months b) 6 Months c) 1 Year d) 2 Year
29.	What is cutie pie in radiology?	a) A cute person in radiology b) A type of cookies in radiology c) Gas-filled radiation detector d) Film Reader
30.	The dosimeter which looks like a fountain pen is:	a) Film badge dosimeter b) TLD c) Pocket dosimeter d) None of the above
31.	Why are TLD badges worn at chest level?	a) Estimate the dose of hands b) Estimate the dose to the whole body c) Estimate the dose to reproductive organs d) None of the above

IX. DATA ANALYSIS

Data were obtained by using descriptive statistics and tubulated in Microsoft Excel Spreadsheet. Statistical analyses were performed with Microsoft Office 2019. Descriptive statistical tools like mean, frequency, and percentage were used to interpret the results.

X. RESULT

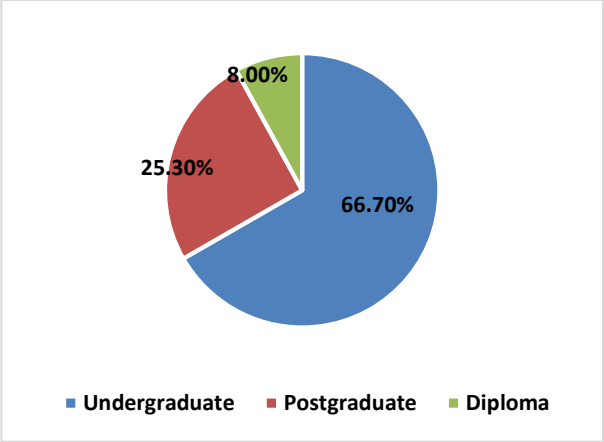
table 2: socio-demographic data of respondents

DEMOGRAPHIC DATA	VARIABLES	RADIOLOGY STUDENTS	
		NUMBER (N)	PERCENTAGE (%)
GENDER	MALE	85	56.7%
	FEMALE	65	43.3%
	OTHER	0	0%
AGE (IN YEARS)	19-22	97	64.6%
	23-26	46	30.7%
	27-30	06	4%
	30 ABOVE	1	0.7%
COURSE	DIPLOMA	12	8%
	UG	100	66.7%
	PG	38	25.3%
OCCUPATION	STUDENT	131	87.3%
	INTERNEE	19	12.7%
ACADEMIC YEAR	1ST YEAR	56	37.3%
	2ND YEAR	57	38%
	3RD YEAR	19	12.7%
	INTERNEE	18	12%
CLINICAL EXPERIENCE	1-6 MONTHS	55	36.6%
	7-12 MONTHS	16	10.7%
	1-3 YEARS	16	10.7%
	NO CLINICAL EXPERIENCE	63	42%
CLINICALLY POSTED IN	X-RAY	56	37.4%
	CT SCAN	21	14%
	MRI	11	7.3%
	NONE	62	41.3%
HOSPITAL TYPE	GOVERNMENT	18	12%
	SEMI GOVERNMENT	17	11.3%
	PRIVATE	54	36%
	NONE	61	40.7%

Responders

In the present study, 150 participants were enrolled who gave their consent to participate in the study. The respondents were aged 19 to 35 years (mean =37.5). Most of the respondents were males (56.7%), and the female participant percentage was (43.3 %).

Respondents involved in this questionnaire are pursuing different courses in medical imaging technology as asked about their current courses. Most of the respondents are pursuing a Bachelor's degree, 100 out of 150 (66.7 %) followed by the Master's degree of 38 (25.3%) and a Diploma about 12 (8.0%) as shown in pie chart 1.



pie chart 1: shows respondents perusing different courses at mit

Another question was about a year they are studying to which 150 respondents had responded and about 56(37.3%) respondents are in ist year, 57 (38.00%) are in 2nd year, 19 (12.7%) are in 3rd year and 18 (12.00%) are internee.

table 3: academic year wise distribution of respondents.

ACADEMIC YEAR	NUMBER OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
IST YEAR	56	37.3%
2ND YEAR	57	38%
3RD YEAR	19	12.7%
INTERNEE	18	12%
TOTAL	150	100%

The respondents involved in this study were also asked about clinical experience and I got the responses as, about 55 (36.6%) have an experience of 1-6 months, 16 (10.7%) had a clinical experience of 7-12 months, 16 (10.7%) have the clinical experience of 1-3 years and 63 (42.00%) respondents have no clinical experience as shown in chart 2.

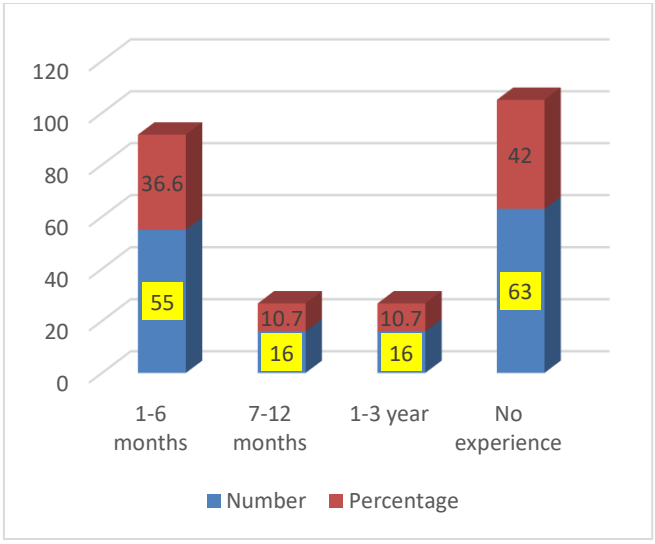


chart 2: clinical experience of the respondents

Knowledge of Radiation protection devices among respondents

Although the majority, 120 (80.0%) respondents were aware of the fundamental of radiation protection. Participants responded that they have good knowledge of radiation hazards, protection, and radiation protective devices. We had asked many questions related to the protective devices and their use in radiography, besides that we also ask them some questions about the handling and utilization of different radiation safety devices shown in table 4.

table 4: knowledge of radiation protection devices, their uses, and handling.

Variable	Correct response (%) n=150
1. Which all are known as cardinal principles of radiation protection?	49 (32.7%)
2. Which among the following is fundamental to radiation protection?	120 (80.0%)
3. ICRP stands for?	128 (85.3%)
4. Radiation protection shields are made up of?	138 (92.0%)
5. Radiation exposure occurs in all except?	113 (75.3%)
6. Full form of ALARA is	123 (82.0%)
7. If the lead apron is used, then at which place the film badge is worn?	61 (40.7%)
8. The lead apron must have a lead equal thickness of	106 (70.7%)
9. To protect the patient's reproductive organs, which of the following method will be used	109 (72.7%)
10. The lead equivalent thickness of the glass viewing window of the control panel is	79 (52.7%)
11. In radiology department, walls are coated with which of the following	119 (79.3%)
12. Full form of TLD is	123 (82.0%)
13. There are how many discs in a TLD	87 (58.0%)

14. How many types of TLD badges are available?	58 (38.7%)
15. In diagnostic radiology, right position to wear a TLD on body is:	117 (78.0%)
16. Thickness of TLD disc is	35 (23.3%)
17. TLD badge is used for?	103 (68.7%)
18. In OSL dosimeter, OSL stands for	111 (74.0%)
19. How is OSLD readout	64 (42.7%)
20. What is recommended period to wear a OSL badge:	54 (36.1%)
21. What is cutie pie in radiology?	96 (64.1%)
22. The dosimeter which looks like a fountain pen is	104 (69.3%)
23. Why are TLD badges worn at chest level?	107 (71.3%)

KNOWLEDGE QUESTIONNAIRE

This tool consists of 23 multiple choice questions, each of which had four options in which there were three incorrect with one correct option. The structured knowledge questionnaire was scored as either one for a correct response or zero for an incorrect response. The knowledge score was summed and computed for analysis. The score interpretations were counted from 75%-100% (17.25-23) as excellent knowledge, from 50%-75% (11.5-17.25) as good knowledge, and below 50% (less than 11.5) as poor knowledge as shown in table 5.

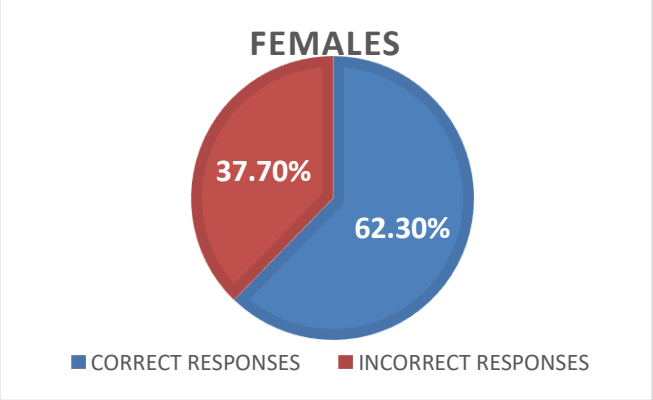
table 5: distribution of respondents on the basis of their knowledge

SCORE	GRADING
42(28%)	**POOR KNOWLEDGE**
52(34.7%)	**GOOD KNOWLEDGE**
56(37.3%)	**EXCELLENT KNOWLEDGE**

In this study, out 150 respondents 56(37.3%) were having excellent knowledge, 52(34.7%) were having good knowledge and 42(28%) were having poor knowledge regarding radiation protection devices, their uses and handling.

ASSOCIATION OF KNOWLEDGE AMONG RADIOLOGY STUDENTS REGARDING RADIATION PROTECTION DEVICES, THEIR USES AND HANDLING.

The study showed least difference in the knowledge of males and females i.e.; Males were having 65.3% knowledge and females were having 62.3% knowledge regarding radiation protection devices, their uses and handling.



pie chart 3: comparison of knowledge on the basis of gender.

XI. DISCUSSIONS

A large proportion of the respondents in this study demonstrated good knowledge of radiation hazards and protection. Whereas, awareness about TLD and the use of TLD during the radiographic examination as the device for measuring radiation exposure was low among the participants. This is of serious concern because they could develop a complacent attitude towards radiation safety challenges at work. The study also shows that most of the participants are aware of the guidelines issued by the International Commission on Radiological Protection (ICRP) and the International Atomic Energy Agency (IAEA) regarding safe operations and handling of different radiation protective devices.

DEMOGRAPHIC CHARACTERISTICS

In my study, the sample size for radiology students consists of 150 subjects out of which 85 (56.7%) were Males and 65 (43.3%) were females. Out of 150 respondents, 64.6% (97) respondents are from the 19-22 years age group.

KNOWLEDGE REGARDING RADIATION PROTECTION DEVICES, THEIR USES AND HANDLING

The current study shows an overall good response from Radiology students of Jamia Hamdard, New Delhi. Majority of the population i.e.; 37.3% had excellent knowledge, 34.7% had good knowledge, and 28% had poor knowledge regarding radiation protection devices. While dealing with individual questions it is revealed that most of the respondents have good knowledge about the fundamental of radiation (Radiation Protection Principal) as shown in Chart 4.

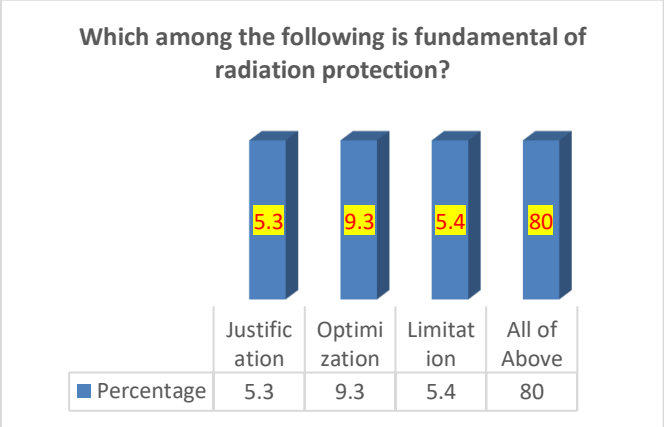
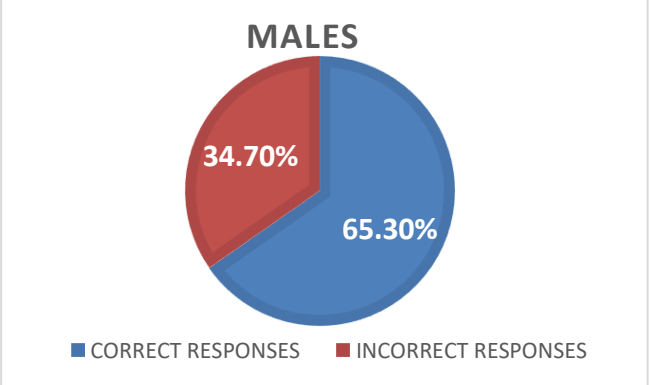


chart 4: showing that the participants have good knowledge of radiation protection principle.

The study also shows that most of the students have very less knowledge about the thickness of lead disc (23.3%) as shown in chart 5 or recommended period to wear an OSL badge (36%) as shown in chart 6 or types of TLD badges (38.7%) as shown in chart 8 or cardinal principles of radiation protection (32.7%). There is a need for further awareness and



knowledge about these important aspects by employing lectures, books, seminars, or other feasible method so the

persons associated with the medical imaging technology would use these types of equipment for safe operations. It is also important a person associated with this particular medical field has good knowledge of the effects of radiation on the human body so he/she will be more cautious while using any type of imaging modality that has radiation. It is also important that the persons working in the imaging department should know the radiation protection principle and different guidelines issued from time to time by international and national organizations like ICRP, AERB, NCRP, etc. for safe operations.

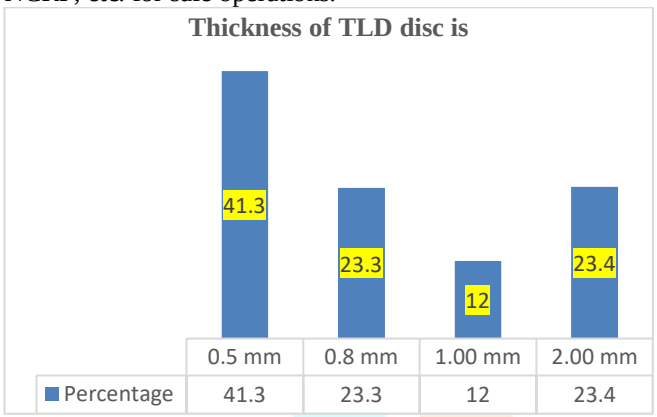


chart 5: shows that most of the students have very less knowledge about the thickness of a lead disc.

chart 6: shows that most of the students have very less knowledge about the recommended period to wear an OSL badge

The study also suggests that the respondents involved in the study have good knowledge of ALARA, ICRP, and shielding used during the radiographic procedure as shown in Table 4.

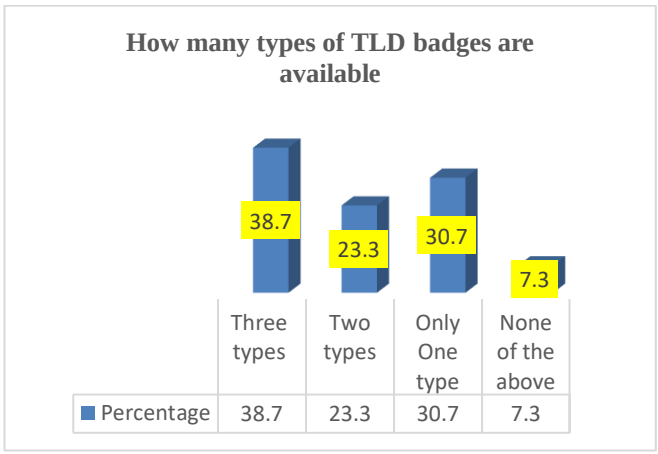


chart 7: shows that most of the students have very less knowledge about the types of TLD badges available.

XII. CONCLUSION

This study demonstrated that most of the respondents show a good knowledge of radiation hazards, radiation protection, and safety, despite poor radiation protection practices, but still, radiation exposure and prevalence of abnormal clinical conditions were found to be below. Therefore, there is a need for periodic training and regular monitoring of occupationally exposed health workers as well as students to ensure compliance with radiation safety regulations. It is also important to update the students and radiology technologists about new techniques and developments to decrease the radiation risks and accidents.

We suggest the subsequent suggestions for radiology students who put on radiation protection devices on a regular basis; all the students must have an induction and guidance on ionizing radiation. Moreover, all the radiology students must be knowledgeable about the unique kinds of radiation safety devices to be had and the way to select one suitable to their line of work and frame type. We additionally recommend that the radiation safety devices inventory in hospitals must be frequently audited and checked for any harm or defects. Further re-assessment can take place to determine if these measures have progressed radiology student's comfort. It is also the responsibility of radiology technologists to work under guidelines issued by different national and international organizations to make a safer environment for imaging.

XII. Conflict of interest: - The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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