



Evaluation Of The Knowledge Of Radiation Protection And Its Equipment's Among Radiographers And PG Students.

¹ Mohit Deswal, ² Navreet Boora, ³ Arshad Alam Khan, ⁴ Ashita Jain

¹⁻⁴ Assistant Professor

Faculty of Allied Health Sciences, SGT University, Gurugram, Haryana, India.

***Corresponding Author:**

Mohit Deswal

Assistant Professor, Faculty of Allied Health Sciences, SGT University, Gurugram, Haryana, India.

Type of Publication: Original Research Paper

Conflicts of Interest: Nil

Abstract

Purpose: Assessment of the knowledge of radiation protection and its equipment's among radiographers and PG students.

Methodology: Study involves the collection of data from radiographer's and PG student's (M.Sc. RIT) by filling questionnaire form.

Result: This study contains a total 30 participants, sub distributed in two different groups (09 Radiographer & 21 PG Students). Radiographers have experience from 1 to 12 years. 2 Radiographers have diploma and 07 have degree. Out of 30 participants 13 have sufficient knowledge about level on ionizing radiation risk, 12 have sufficient knowledge of prevention or radiation risk, 16 participants know about harmful radiation, and 23 know about which tissue is more susceptible to ionizing radiation damage. All participants have adequate knowledge and know about RSO. 22 participants know about MPD limits for occupational per year whereas 23 know about the personnel monitoring devices.

Conclusion: knowledge of radiation protection and its equipment's among radiographers and PG students was good. But for further improvements need to organize awareness programs like CME, Conferences, workshops & guest lectures.

Keywords: PG, M.Sc. RIT, RSO, MPD

Introduction:

The discovery of X-ray was done by Sir W.C Roentgen on 8 November 1895. A German physicist gave rise to radiation medicine. After the discovery, ionizing radiation became very useful in diagnostic radiology. Radiology plays an important role in modern diagnostic radiation medicine. The main purpose of radiation in the radiology department is for diagnosis but nowadays it is using as a therapeutic purpose also. X-rays are a type of ionizing radiation that behaves like a wave as well as a particle. X-rays are ionizing radiation and it is harmful. These radiations can cause significant damage to living cells. Radiation is often categorized in 2 types:

ionizing or non-ionizing, depending on the energy of the radiated

particles. Ionizing radiation consists of more than 10 eV. Radioactive material is the common source of ionizing radiation that emits α , β , or γ radiation.

Other sources include X-rays from medical radiography. The higher energy range of ultraviolet light and X-rays constitute the ionizing part of the electromagnetic spectrum. The word "ionize" refers to the breaking of one or more electrons away from the atom, an action that requires high energies. Further down the spectrum, the non-ionizing constitutes of lower energies of the lower ultraviolet spectrum cannot ionize atoms; a good example of this

is sunburn caused by long-wavelength solar ultraviolet.[2]

Biological effects of radiation: X-Rays and other sources of radiation have high energy that can damage DNA and causes cancer. Radiation includes risk is more controversial at doses 10 and 100 mSv. If you are exposed to a small amount of radiation over a long time, it raises your risk of cancer. [3] Radiation risk is mainly of two types: -

- **Stochastic effect:** Effect on exposing the individual

e.g.: Cataract, Arrhythmia, and Cancer

- **Deterministic effect (Non-stochastic):** effect on offspring to individual expose

e.g.: Missing Organ, Microcephaly

Importance of radiation knowledge: In early days there was no vision about the potential harms including various diseases like cataract, hematological disorder, and cancer which necessities considering radiation protection strategies such as “ALARA”. [6]

Benefits of radiation protection equipment’s: Our radiation protection equipment must have in X-ray productions and radiology personal protective equipment such as lead apron, lead glasses, lead shield, gonad shield, thyroid shield, etc. This safety states that all the things in radiation protection equipment which made of lead that stops the harmful radiation from entering into the body of an individual and causes them. These equipment’s protect our body from injury and infections related to tissue from the coming radiation during the exposure. These equipment’s protect workers and patients from unneeded radiation that harms our bodies. [7]

Knowledge required for PPE devices to students: The lack of knowledge and awareness of medical professionals regarding ionizing radiation or the use of equipment involved in the process. It was necessary that the basic knowledge regarding radiation exposure and protective devices was insufficient among students So, it is important to have knowledge about the personnel protective equipment’s and radiation effects. [9]

Need of Study

In our hospital, radiographers and PG students are in regular touch with patients and with equipment’s. However various investigations had been done and there was more ionizing radiation which will affect the patient and as well as worker. The radiographers and PG students have adequate knowledge about effects of radiation and protective devices which are used in radiology department. That’s why this topic is chosen to perform a study.

Aim:

To evaluate the knowledge of radiation protection and its equipment’s among radiographers and PG students and aware radiographers and PG students about the radiation protection devices and equipment’s.

Materials And Methods:

This is a Quantitative, Correlated and Prospective study involving the questionnaire form filled with 30 participants. Questionnaire consisting of 30 questions in which 10 are closed ended format and 5 are open ended questions was distributed to participants working in the radiology department of SGT Hospital, Gurugram, Haryana. Questionnaire not contains any column for name and batch to maintain privacy of radiographers and PG students result and to get the best result. In study there are 9 radiographers and 21 PG students.

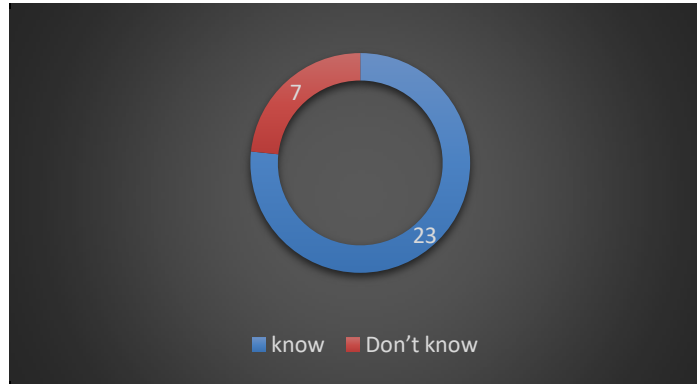
Selection Criteria: In this study following participants under inclusion and exclusion criteria, all Radiographers and PG students (M.Sc. RIT) were taken under inclusion criteria. Radiologist, Degree students (B.Sc. RIT), Nursing staff, Patient attendant and Non radiation working staff were taken under as exclusion criteria.

Data Analysis: The study was analyzed using different methods such as mean, medium and standard deviation. Chi squared test will be used to examine association between different variables.

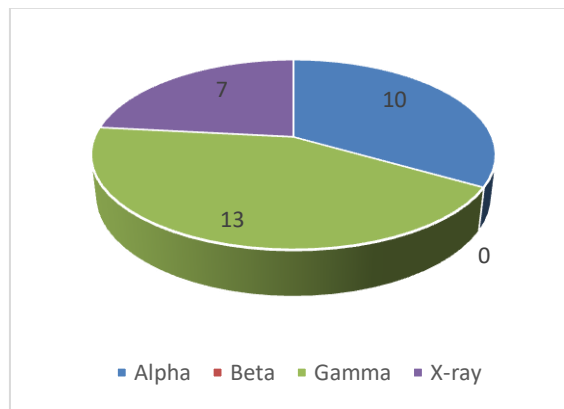
Result: In this study, data collected with help of questionnaire form filling from radiographers & PG students (30 participants) of the radiology department. The data was collected in MARCH 2020. The result shows that knowledge and uses about radiation protection devices with their qualifications and below (table I) shows the representation of the collected data.

Table I) Showing the data observed by questionnaire.

Question	Right (%)	Wrong (%)
9. In fluoroscopy procedure TLD batch Should be worn?	73.4%	26.6%
10. At which place, TLD is sent For dose measurement?	53.4%	46.6%
11. Which tissue is more susceptible to Ionizing radiation damage?	76.7%	23.3%
12. Which device maintain permanent Record of radiation exposure?	30%	70%
13. TLD should be check after every?	93.4%	6.6%
14. Film batch detects?	56.7%	43.3%
15. What is principal reason for Wearing a dosimeter?	63.4%	36.6%
16. Which disease may be a result of Stochastic radiation damage?	43.4%	56.6%
17. Concept of dose optimization?	63.4%	36.6%
18. Thickness of lead apron in routine Procedures?	40%	60%
19. Which modality have maximum Radiation dose for patients?	93.4%	6.6%
20. Distance between X-ray tube and chest stand in chest PA should be?	63.4%	36.6%
21. X-ray source to object distance?	76.7%	23.3%
22. Which method reduce the radiation Exposure?	50%	50%
23. RSO stands for?	100%	00%
24. what is the average dose for PA chest radiography?	23.4%	76.6%



(Graph No. I) of volunteer know about the personnel monitoring device



(Graph No II) According to volunteer knowledge which radiation is more harmful.

Conclusion:

Study concluded that knowledge of radiation protection and its equipment's among radiographers and PG students was good. But for further improvements need to organize awareness programs like CME, Conferences, workshops & guest lectures.

References:

1. Aysegul Yurt, Berrin Cavusoglu1, Turkan Gunay Evaluation of Awareness on Radiation Protection and Knowledge About Radiological Examinations in Healthcare Professionals Who Use Ionized Radiation at Work. DOI: 10.4274/mirt.00719
2. Sharma BR, Singh S, Mandal S, Poudel N Knowledge of Radiation Exposure and it Risk among Radiographers and Radio Technologists J-GMC-N | Volume 12 | Issue 02 | July-December 2019

3. Jin-song Wang, Hai-juan Wang and Hai-li Qian Biological effects of radiation on cancer cells. doi.org/10.1186/s40779-018-0167-4
4. Ferid Shannoun, Maria Blettner, Heinz Schmidberger, Hajo Zeeb Radiation Protection in Diagnostic Radiology DOI:10.3238/arztebl.2008.0041
5. Agapi Ploussi, Efstathios P Efstathopoulos Importance of establishing radiation protection culture in Radiology Departmental DOI: 10.4329/wjr.v8.i2.142
6. Kyung-Hyun Do General Principles of Radiation Protection in Fields of Diagnostic Medical Exposure http://dx.doi.org/10.3346/jkms.2016.31.S1.S6 • J Korean Med Sci 2016; 31: S6-9
7. John Le Heron, Renato Padovani, Ian Smith, Renate Czarwinski Radiation Protection of Medical Staff Doi: 10.116/j.ejrad.2010.06.034

8. Fatemeh Shabani, Hadi Hasanzadeh, Alireza Emadi, Majid Mirmohammadkhani, Ahmad Bitarafan-Rajabi, Ali Abedelahi, Mitra Bokharaeian, Hamed Masoumi, Danial Seifi, Tahereh Khani, Mohamad Sanchooli, Shima Moshfegh, and Abbas Ziari. Radiation Protection Knowledge, Attitude, and Practice (KAP) in Interventional Radiology DOI 10.5001/omj.2018.26

9. Maryam Mojiri, Abbas Moghimbeigi. Awareness and attitude of radiographers towards radiation protection. Autumn 2011 Vol.2, No.4 ISSN 2008-4978

10. Arkadiusz Szarmach, Maciej Piskunowicz, Dominik Swieton, Adam Muc, Gabor Mockallo, Jaroslaw Dzierzanowski, Edyta Szurowska Radiation Safety Awareness Among Medical Staff. DOI: 10.12659/PJR.892758

11. F. Paolicchi1 & F. Miniati & L. Bastiani & L. Faggioni & A. Ciaramella & I. Creonti1 & C. Sottocornola1 & C. Dionisi & D. Caramella1. Assessment of radiation protection awareness and

knowledge about radiological examination doses among Italian radiographers. DOI 10.1007/s13244-015-0445-6

12. Cletus Uche Eze, Livinus Chibuzo Abonyi, Jerome Njoku, Nicholas Kayode Irurhe, and Oluwabola Olowu. Assessment of radiation protection practices among radiographers in Lagos, Nigeria doi: 10.4103/0300-1652.126290

13. Afaf Mohamed Taha Elamin. Radiation Safety Awareness and Practice in Sudanese Medical Facilities: A Descriptive. Paper ID: SUB154703 International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064

14. Ferid Shannoun, Maria Blettner, Heinz Schmidberger, Hajo Zeeb. Radiation Protection in Diagnostic Radiology Deutsches Arzteblatt International Dtsch Arztebl Int 2008; 105(3):41–6

15. Szarmach A, Piskunowicz M, Swieton D, Muc A, Mockallo G, Dzierzanowski J, Szurowska E. Radiation safety awareness among medical staff. doi: 10.12659/PJR.892758