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A Study On Knowledge & Awareness Of Work Safety Amongst Employees Working In Radiology Department In A Tertiary Care Hospital.

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ABSTRACT

The radiation exposure is one of major risk factor for hospitals which not only affects employees but also to patients and their relatives. The risk of cancer is increasing because of increase in tomograhic examinations in recent era.Various studies had shown that the knowledge &awareness level of health workers towards radiation safety is very less so every year about 90% healthcare workers are exposed to radiation. The purpose of this study was to assess the level of Knowledge and awareness regarding radiation safety among radiology technicians& allied healthworkers. In this cross sectional study the technologists & allied healthworkers and residents, fellows of the Department of Radiology are included in the study.The prevalidated questionnaire used was obtained from a literature knowledge study obtained from AERB guidelines and other Radiological society guidelines. The questionnaire was comprised of 2 sections.First section includes demographic characteristics like Gender, Age, Qualification,Work experience.Second section comprises of 20 questions based on knowledge, awareness & good practices. A prevalidated Questionnaire will be given to radiology technicians and allied healthworkers in google form format and from their responses data analysis is done. The Questionnaire includes open as well as closed ended questions. A well informed valid consent will be obtained from participants. The mean score of correct answers was 10.93 out of 20 (50 %).90.32% of the employees were male (n=56), and 9.67% of the workers were female (n=6). 53 % Individuals taking part in the study were between 18 to 27 yrs old,29 % between 28 to 37 years old and 17 % between 38 to 57 yrs old.63 % have less than 5 yrs experience while 4.8 % have more than 25 yrs of experience.Considering their educational backgrounds, it was detected that 40.3% had an associate's degree (n=25), 24.19% had a high school diploma (n=15), 12.9% had a bachelor's degree (n=8) and 6.45% had a master's degree (n=4). The results of this survey show knowledge deficit among all radiology workers, including residents, fellows and technologists.Staff radiologists should impart knowledge & updates in the fields to technicians, residents, fellows regularly as well provide expert counselling on risk and dose issues.

Keywords: Radiation dose, Radiation risk, Technologists, Cancer risk, Questionnaire

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INTRODUCTION

Radiation safety can be defined as the protection of people and the environment against ionizing radiation beams [1, 2]. Medical personnel should have adequate information about the issue to protect both themselves and patients from harmful effects of radiation. Most of the mistakes made result from a lack of measures and knowledge. Accordingly, employees working with radiation should be given training on radiation, and then, they should be regularly updating their knowledge [3, 4]. Training to these personnel should be directly be given by a health physician or training content should be examined by him/her. There should be detailed training regarding special work responsibilities.

Hospitals are medical institutions that contain lots of risk factors. One of these risks is exposure to radiation. This matters to employees, patients, and their relatives. Previous studies had shown that the number of tomographic examinations have increased in recent years and that will increase risk of cancer. Recent studies also show that low dose radiation applications used for diagnosis may influence human health negatively.

Various studies shown that the knowledge level of health workers are insufficient in terms of radiation safety so about 88 to 90% healthcare workers exposed to radiation every year.so we need to know in our setup the knowledge & awareness of radiology technicians & allied healthworkers about radiation safety and to overcome this what will be the measures to minimize the radiation risk to employees as well as patients.The purpose of this study was to assess the level of awareness regarding radiation safety among radiology technicians.

MATERIAL AND METHODS

Data Collection is done from the Radiology technicians & allied healthworkers of tertiary care hospital in Maharashtra.

Sample Size

62 (Includes male & female)

Inclusion Criteria

The technologists & allied healthworkers and residents, fellows of the Department of Radiology are included in the study.

The prevalidated questionnaire used was obtained from a literature knowledge study obtained from AERB guidelines and other Radiological society guidelines. The questionnaire was comprised of 2 sections. First section includes demographic characteristics like Gender, Age, Qualification, Work experience. Second section comprises of 20 questions based on knowledge, Awareness & good practices. A prevalidated Questionnaire will be given to radiology technicians and allied healthworkers in google form format and from their responses data analysis is done. The Questionnaire includes open as well as closed ended questions. A well informed valid consent will be obtained from participants.

Data Analysis

The study will be carried out on radiology technicians & allied health workers,residents and fellows employed in a Radiology Department of a private Trust Hospital. Employees were given a survey obtained from a literature review, a Questionnaire on Radiation awareness by Society of Radiology, and other related resources. The results will be then analyzed with frequency and proportion.The questionnaire includes socio-demographic characteristics of participants ,knowledge about awareness of radiation safety will be checked. It will be prepared from a literature knowledge study carried out by different Society of Radiology,AERB Guidelines. The questionnaire will be comprised of radiation safety (general expressions), to determine radiation awareness of radiation personnel . All steps of our study were designed according to the ALARA principle, Declaration of Helsinki, BARC & AERB guidelines.Data obtained in the study, was transferred into Statistical Package for the Social Sciences (IBM SPSS Statistics) 19.0 software and analyzed. In the analysis of the data, frequency& proportion were used.

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RESULTS

90.32% of the employees were male (n=56), and 9.67% of the workers were female (n=6). 53 % Individuals taking part in the study were between 18 to 27 yrs old,29 % between 28 to 37 years old and 17 % between 38 to 57 yrs old. 63 % have less than 5 yrs experience while 4.8 % have more than 25 yrs of experience. Considering their educational backgrounds, it was detected that 40.3% had an associate's degree (n=25), 24.19% had a high school diploma (n=15), 12.9% had a bachelor's degree (n=8) and 6.45% had a master's degree (n=4).

Table 1: Demographic profile

Age	18-27	33	53.22 %
	28-37	18	29.03 %
	38-47	8	12.9 %
	48-57	3	4.8 %
Gender	Male	56	90.32 %
	Female	6	9.67 %
Term of service	Below 5 yrs	39	62.90 %
	6-10 yrs	8	12.90 %
	11-15yrs	4	6.45 %
	16-20 yrs	6	9.67 %
	21-25yrs	2	3.22 %
	25 yrs & more	3	4.83 %
Educational background	High school	15	24.19 %
	Associate degree	25	40.32 %
	Bachelor's degree	8	12.90 %
	Master's degree	4	6.45 %

Table 2: Results of questionnaire on radiation knowledge level

Question	Correct answer	n	%
1. Average natural background radiation is in the range	2-3mSv	20	32.25
2.Approximate effective dose received by a patient in a single-view chest X-ray is	0.02mSv	16	25.8
3.Approximate effective dose received by a patient in a Abdominal X-ray is	1-5mSv	30	48.38
4.Do not use grids for-	Paediatric patient	48	77.419
5. Dosage from two-view unilateral mammogram is	10–20 times the single-view chest X-ray	18	29.03
6. Which of the following has no radiation risks:	MRI	56	90.322
7. Please select which one of the following is most sensitive to radiation:	Children	42	67.74
8.Approximate estimated risks of fatal cancer from CT head	Very low: 1 in 100,000 to 1 in 10,000	24	38.7
9.Collimator use do the following except	Increase scatter radiation	26	41.93
10. Following are basic 3 factors for radiation protection except	Exposure rate	26	41.93
11. ----------period of exposure to radiation to ---------- the dose received from source.	Decrease, decrease	18	29.03
12.----------distance from source to ----------exposure rate.	Increase, Decrease	35	56.45
13. Radiation dose would be reduced by more than ----% by using lead aprons	90%	22	35.48

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14. Shielding adequacy should be checked atleast once in ------	2 years	14	22.58
15.Which is false about TLD Badge-	TLD protects us from radiation	32	51.61
16. Which is good practice about wearing TLD-	TLD with Cassette	49	79.03
17. Which is good practice about wearing TLD	TLD below lead apron	41	66.12
18. Where to store TLD badge when not in use	Office room	56	90.322
19. What is low dose protocol for patient safety	High Kv & Low mA	52	83.87
20. Mobile Xray machine should be operated from a distance of -------m of length	2m	35	56.45

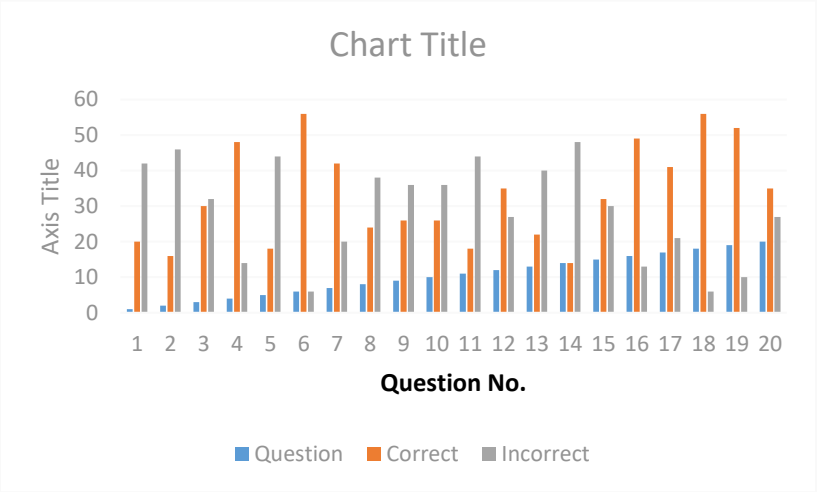

Figure 1: The right and wrong answers to each question shown in figure.

10.93 out of 20was the mean score of correct answers which is 50 %. These scores ranges from 5 to 17 out of 20 correct answers.

The percentage of the employees who answered more than half of the questions correctly was found to be 64.51% (n=40). It was detected that 40% of ones who scored 50% & more were between the ages of 18–27, ones with an associate's degree (75%).It is observed from the study that more experienced personnel having more knowledge and awareness about radiation safety.Less experienced personnel should be given training on regular basis.

DISCUSSION

Our study results indicate overall average knowledge on radiation dose and risk among technologists,radiology residents, fellows of the Department of Radiology. Our study results reflect a knowledge deficit among radiology workers. Nearly half of our study group scored less than 50 % on questions of radiation dose and risks. The study group is not homogeneous. One of the most frequently performed radiology examination is chest X-ray and nearly half of the participants did not know about the dosage from a single view chest X-ray. This is not different from prior publications [1, 2].

The overestimation as well as underestimation of cancer risk due to knowledge deficit in routinely performed examinations should be taken seriously to avoid repeated as well as unwarranted examinations which is causing significant radiation hazard and is of major public health concern.

More than 90 % of technologists correctly identified the absence of radiation risk in MRI and 40% correctly identified radiation risk in the paediatric population. This is in strong contrast to prior studies among physicians reporting variably poor knowledge. There are some limitations to the study. It is a single tertiary care institutional study. Before coming to any action the sample size also should be taken

into account. Comprehensive radiation knowledge cannot be compared with the questions based on radiation dose & cancer risk. Many of our participants opined that many questions based on numeric were not practicable as exact numerical value will be difficult to memorize. But as radiology workers, they should have deeper and more accurate knowledge on radiation dose and cancer risks and this should be imparted from the beginning of radiology training. Few provisions made in questionnaire as they were interrelated and one can easily deduce the answers from other questions as well the questions based on effective dose and cancer risk have a wide range of variable answers. As the survey was performed online with a few days time given, there might be the search of answers from various resources which will not give the real idea of status of knowledge. There might be the chances that the real knowledge is much less than evaluated.so it is very important to take knowledge about radiation dose and risk more seriously [5, 6].

We are trying to enforce many of the recommendations which includes improving medical physics training during residency, including radiation safety topics in exit examinations, regular in-service training for technologists on hazards of radiation & radiation safety,advanced training of senior technologist so they can give periodic training to other staff [3]. Periodic continuous medical educational (CME) activities are recommended among radiology workers [4] and we are working to make this mandatory for all, including the staff radiologists irrespective of subspecialties to attend CME to keep them updated on radiation risks & dosage. This will be very useful in future for reducing the cancer risk due to overuse of imaging technolog. Inclusion of patient's total radiation exposure and radiation dosages in the imaging report and in the radiology request forms will create more awareness not only in physicians but also in patients and eventually reduce the inadvertent use of imaging technology [7, 8].

Although the questionnaire was not an all-inclusive one and not an ideal way of knowledge assessment with numerous limitations as already Discussed, knowledge deficit was observed on Radiation dose levels and Cancer risk due to different imaging modalities. As technologists are first contact persons with patients and relatives they should be adequately trained so as to answer common questions and give satisfactory explanation.The next level of contact is the speciality residents and fellows, who are often called upon to advise colleagues in other departmental faculties & residents and patients about dose and safety concerns.Senior Staff radiologists is the key person not only for acquiring the knowledge but also for imparting the knowledge of radiation safety and updates in the field to the juniors at regular intervals so they can provide expert advice whenever required.

CONCLUSION

The results of this survey demonstrate a knowledge deficit among all radiology staffs , including residents, fellows and technologists. Overall there is significant casual attitude regarding use of dosage and cancer risk from common radiological examinations. Inaccuracy is seen even at estimation of the dosage of commonly performed chest X-rays.

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REFERENCES

[1] Parlar Ş, Ergülen A. Trakya Üniversitesi Hastanesi radyasyon güvenliği elkitabı; 2009. Available from: URL: http://bys.trakya.edu.tr/data/file.php?id=90481916

[2] Tosun FC, Ofluoğlu TY. Ondokuz Mayıs Üniversitesi Sağlık Uygulama ve Araştırma Merkezi radyasyon güvenliği el kitabı; 2013.Available from URL:http://hastane.omu.edu.tr/downloads/files/OM%C3%9C-RGK%20EL%20K%C4%B0TABI-2013%20PDF.pdf

[3] Yücel D, Palacı H, Timlioğlu S, Şahan Ö, Okur H. Hasta ve çalışan güvenliği kapsamında radyasyon güvenliği hizmet içi eğitim programının etkinliğine ilişkin bir örnek olay çalışması. Uluslararası Sağlıkta Performans ve Kalite Kongresi Bildiriler Kitabı; 19-21 Mart 2009, Antalya;2009; p.133-44.

[4] Kiguli-Malwadde E, Ddungu Matovu P, Kawooya MG, Byanyima RK. Radiation safety awareness among radiation workers and clientele at Mulago Hospital, Kampala, Uganda. East and Central African Journal of Surgery 2006; 11: 49-51.

[5] Güleç S, Toygar E, Yeni Ç, Dalmış KA, Yazgan M. Hastanelerde kullanılan tıbbi cihazların kalibrasyonu ve hasta güvenliği. Uluslararası Sağlıkta Performans ve Kalite Kongresi Bildiriler Kitabı;19-21 Mart 2009, Antalya; 2009; p.152-65

[6] Gunalp M, Gulunay B, Polat O et al. Ionising radiation awareness among resident doctors, interns, and radiographers in a university hospital emergency department. Radiol Med 20:20)

[7] I. Erkan, A. Yarenoglu, E.H. Yukseloglu, H.C. Ulutin. The investigation of radiation safety awareness among healthcare workers in an education and research hospital, International Journal of Radiation Research, July 2019, Volume 17, No 3

[8] Lee CI, Haims AH, Monico EP, Brink JA, Forman HP (2004) Diagnostic CT scans: assessment of patient, physician, and radiologist awareness of radiation dose and possible risks. Radiology 231(2):393–39811.