

Research Article

Knowledge, Attitude and Practice of radiation risk among employees in selected hospitals of Nepal

Rakesh Kumar Jha*¹, Ramesh Nayak², Umashankar Subramanian³

Padmashree School of Public Health, Karnataka, India

¹Radiotechnologist, Shukraraj Tropical and Infectious Disease Hospital, Teku, Kathmandu

²Assistant Professor, Dept. of Physiology, Janaki Medical College, Janakpur, Nepal

³Professor, Padmashree School of Public Health, Bangalore, Karnataka, India

ABSTRACT

Background and Objectives: Nepal is facing the problem of safe, effective and quality radiology services due to lack of adequate knowledge towards advance technology in health sector professionals. Therefore, the present study was designed to focus on the knowledge, attitude and practice on radiation among employee in selected hospitals.

Material and Methods: This is a descriptive cross-sectional study conducted in among technical and non technical staff that were involved in or come across the radiology department. A set of self structured questionnaire and observation was used for data collection. Purposive sampling technique was used for the data collection. The collected data was compiled and analyzed by using SPSS 16.

Results: The total number of staff participated in this study were 113, among them 65(58%) belong to technical group as health Professionals and 48(42%) belong to non-technical group. The knowledge of the technical staff was 66.95%, perception was 87.65% and the having the practice of protection was 75.9% whereas in non-technical staffs were 53.46%, perception is 64.60% and the having the practice of protection is 53.74%.

Conclusion: The overall knowledge of radiation exposure amongst technical and non-technical staffs was average, poor perception and satisfactory practices. Regular training programmes and national legal law should be processed to reduce malpractice in radiations.

Key Words: Knowledge, Non-technical staffs, Perception, Practices, Radiation, Technical staffs

INRODUCTION

Over a century ago, the discovery of the properties of x-rays just gave medicine one of its most powerful and indispensable diagnostic tools. In medicine, Radio-diagnosis and Imaging is one of the vital specializations,

used as a tool for the diagnostic and therapeutic examination [1]. The information about radiology, nuclear medicine and radiotherapy services are limited and the extent of personal dosimeter is also unknown. Nepal has insufficiently regulated medical

radiological practices. Furthermore, it has no radiation protection authority or regulations regarding the use of radiation. Nepal is facing the problem of safe, effective and quality radiology service, requires adequate and qualified professionals beside the advance technology [2-7].

It was actually estimated that about 30% to 50% of critical medical decisions were based on x-ray examinations. In one of the study it had been seen that emergency doctors had a varied knowledge of the risks from radiation exposure, but overall knowledge was poor [4,8]. Significant lapses exist in practice and lack of knowledge of radiation safety. Around over 95% of medical radiation worker had never been monitored for their radiation exposure [8,9].

From the many studies, it had been seen that the knowledge and perception regarding the radiation and its effect was minimum among the technical and non technical staffs in Nepal. It has been seen that radiation safety practices were not according to recommendations by the radiation authority [9]. Minimum studies are done on radiation risk among technical and non technical staffs in Nepal. Due to the scarce of data on knowledge, perception and practice on radiation, the need of the study had been necessary in the perceptive in Nepal. So, this study was designed to assess the knowledge, perception and existing prospective practices of radiation risk among technical and non technical staffs.

MATERIALS AND METHODS

This is a descriptive cross-sectional study conducted on technical and non technical staff in selected hospitals in Nepal in 2014 AD to understand the knowledge, perception

and practice of radiation risk among technical (all the doctors and medical professionals who had some sort of medical training , who were all involved directly or indirectly in radiology department) and non technical staff (common man of hospital) who were involved in or come across the radiology department for some reason and get into the radiologic investigations directly and indirectly in their day to day medical practice by structured and open ended questionnaire. Technical staff included doctor, nurse and paramedical staff and non technical staff includes management staff, ward boy, sweeper, driver etc.

A set of self structured questionnaire and observation was used for data collection. A questionnaire, with a list of questions which were answered by respondents either by writing or verbally. Purposive sampling technique was used for the data collection by the application of probability sampling technique among technical and non technical staff on selected hospitals in Nepal. Data for the study was collected from the following hospitals of Nepal viz. Zonal Hospital, Janakpurdham, District Hospital, Palpa, City Hospital and Research Center, Janakpurdham, Nepal. Written consent was taken from the respective hospitals, respondents prior to the study. The collected data was compiled and analyzed by using SPSS 16.

RESULTS

The data obtained was analyzed on the basis of objectives of the study using descriptive and graphical methods. The hospitals were selected as Private hospital, District hospital and a Zonal hospital. In this study, 37 respondents i.e. 32.7% were from private hospital, 31 respondents i.e. 27.4 % were from District hospital and 45 respondents i.e.

39.8% were from Zonal hospital as shown in fig 1.

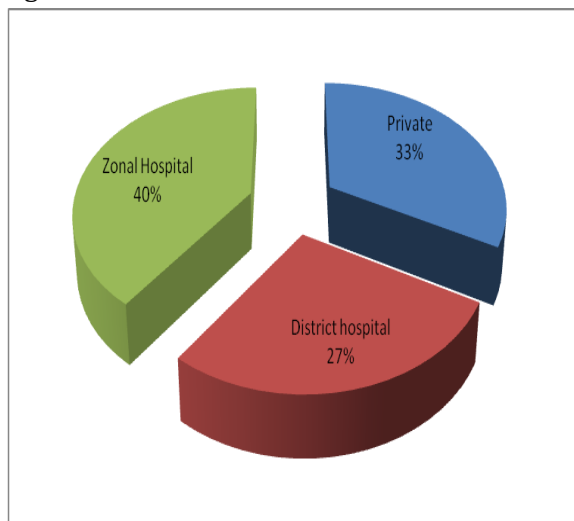


Fig 1: Hospital wise distribution of respondents

There were many type of department working together in a hospital for the promotive, preventive and curative services. In this study 34 % were from other groups which include non technical staffs, accordingly 18 respondent were a physician i.e. 16%, 14 were health Assistant i.e. 12%, nurse were 12, i.e. 11%, accordingly only 1 respondent were radiographer, i.e. 1% as shown in fig 2.

Table 1 highlights that with experience, person can gain the knowledge and improve the practice pattern in their relative field.

Table: 1 Distribution of respondent by number of year of experience.

Experience in year	Frequency (%)
1-5	83 (73.5)
6-10	10(8.8)
11-15	4(3.5)
16-20	5(4.4)
21-25	5(4.4)
26+	6(5.3)
Total	113(100)

In this study, it had been shown that 73.5 % of the respondent belongs to 1-5 years group, accordingly, 8.8% belong to 6-10 years group likewise only 5.3 % of the respondent having the experience of 26+ year experience.

Fig 3 shows total number of staff participated in this study was 113, among them 65(58%) belong to technical group as health Professionals and 48(42%) belong to non-technical group.

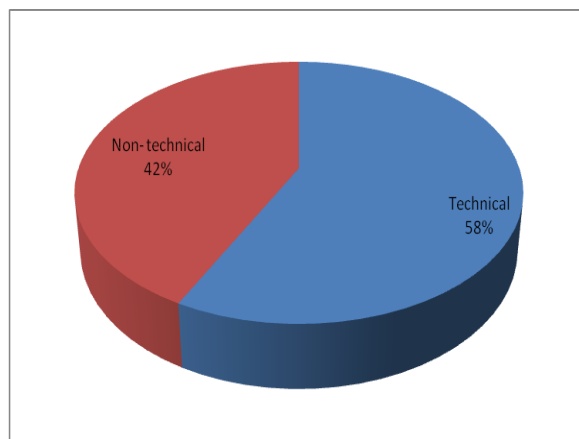


Fig 3: Distribution of staffs

Table 2 shows that most of the respondent i.e. 75.4% used lead apron during the exposure followed by 35.4%thyroid shield, 30.8% lead glass, 30.8 % lead gloves, 12.3% gonard shield and 12.3 % was using other protective material like lead barrier etc.

Table 2: Type of protective measure used

Multiple response	
Type of protective material	Frequency (N = 65)
Lead Apron	49 (75.4)
Thyroid Shield	23(35.4)
Gonard Shield	8(12.3)
Lead Glass	20(30.8)
Lead Gloves	20(30.8)
Other	8(12.3)

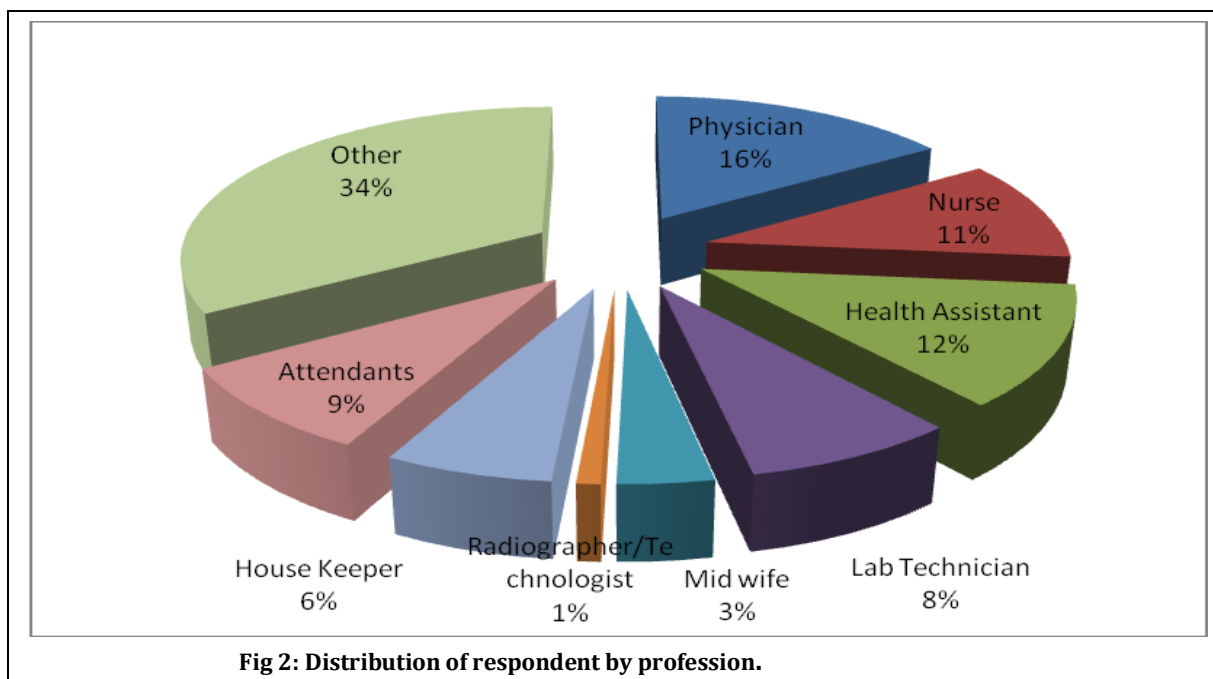


Fig 2: Distribution of respondent by profession.

Table 3 indicates that 30.7 % of the total respondent thinks that they were not in risk of radiation hazard, following 26.7% strongly agreed, 23.8% very strongly agreed, 9.9% moderately and 8.9 % were little agreed that they were in risk of radiation hazard.

Table 4 shows the relation between staff and their knowledge regarding the risk of radiation. 36.9% of technical staffs said they were very strongly agree that they were in risk of radiation, followed by 41.5% strongly agreed, 13.8% moderately agreed, 6.2% little agreed and 1.5% agreed that they were not in risk of radiation whereas 83.3% of non technical staffs agreed that they were not in risk followed by 13.9% were in little risk accordingly 2.8% agreed for moderately in risk of radiation. Table 5 signifies that even 43.2% of non medical respondent having the knowledge of radiation hazard and they were practicing the radiation protection and 56.8% did not practice the radiation protection practice. 45.5% of respondent didn't have the

knowledge of radiation hazard but also they were practicing radiation protection and 54.5% didn't have the knowledge of radiation hazard and they were not practicing radiation protection.

Table 6 shows the relation between the type of hospital and the use of protective measure. The result shows that 88.9% of the technical staff used protective measure in the private hospital, 89.9% used by district hospital and only 64.3% of technical staffs used protective measure in Zonal hospital. The result shows that the 52.6% of non technical staffs did not practice radiation protection in private, 50.0% does not practice radiation protection in district hospital and likewise 64.7% of non technical staff in Zonal hospital did not practice radiation protection. This result shows that the technical staffs use maximum of protective measure by district hospital. The above table shows the relation between the type of hospital and the practice of radiation protection by the non medical staff. Table 7 shows the knowledge,

perception and practice of the technical staff, all the variable having the same, had been selected and getting the average of all the frequency. This study showed the knowledge of the technical staff was 66.95%, perception was 87.65% and the having the practice of protection was 75.9%.

Table 8 signifies the knowledge, perception and practice of the non-technical staffs, all the variable having the same value, had been selected and getting the average of all the frequency. This study showed the knowledge of the non-technical staffs were 53.46%, perception is 64.60% and the having the practice of protection is 53.74%.

DISCUSSION

Everyone alive in this world is constantly being exposed to ionizing radiation and about 18% exposure was due to man-made source. The US National Council on Radiation Protection and Measurement had reported that Medical x-rays and nuclear medicine account for only 15% of all radiation exposures. Similarly, in the UK, estimated 100-250 deaths occur each year from cancers directly related to medical exposure to radiation [1].

Table: 3 Distribution of respondent perception with risk of radiation hazard.

Risk of radiation hazard	Frequency	Percent
Very strongly	24 (23.8)	23.8
Strongly	27(26.7)	26.7
Moderately	10(9.9)	9.9
Little	9(8.9)	8.9
Not in risk	31(30.7)	30.7
Total	101 (100)	100.0
Not answered	12	
Total	113	

Table: 4 Relation between type of Staff and risk of radiation hazard

		How strongly did you think you were in risk of radiation hazard?					Total
		Very strongly	Strongly	Moderately	Little	Not in risk	
Type of staff	Technical	24 36.9%	27 41.5%	9 13.8%	4 6.2%	1 1.5%	65 100%
	Non technical	0 .0%	0 .0%	1 2.8%	5 13.9%	30 83.3%	36 100%
Total		24 23.8%	27 26.7%	10 9.9%	9 8.9%	31 30.7%	101 100%

Table: 5 Relation between knowledge of radiation hazard and practice of radiation protection

		Did you practice radiation protection?		Total
		Yes	No	
Knowledge of radiation hazard	Yes	16 43.2%	21 56.8%	37 100%
	No	5 45.5%	6 54.5%	11 100%
Total		21 43.8%	27 56.2%	48 100%

Table 6: Relation between type of hospital and use protective measure

Type of hospital	Use of protective measure (n=65)			Use of protective measure (n= 48)		
	Yes	No	Total	Yes	No	Total
Private hospital	16 88.9%	2 11.1%	18 100%	9 47.7%	10 52.6%	19 100%
District hospital	17 89.5%	2 10.5%	19 100%	6 50.0%	6 50.0%	12 100.0%
Zonal hospital	18 64.3%	10 35.7%	28 100%	6 35.3%	11 64.7%	17 100%
Total	51 78.55%	14 21.5%	65 100%	21 43.8%	27 56.2%	48 100%

Table: 7 Knowledge, perception and practice of technical staffs

Knowledge			
Level of knowledge	Associated with radiation	Aware of impact of radiation	Average percentage
Not much	30.8%	35.4%	33.10%
Moderate	38.5%	10.8%	24.65%
Strong	30.8%	53.8%	42.3%

Perception			
Perception	Fear of Radiation	Knowledge difficulty	Average percentage
Not at all	18.5%	6.2%	12.35%
Slightly moderate	41.5%	64.6%	53.05%
Strongly moderate	40.0%	29.2%	34.6%

Practice				
Practice	Discuss risk of radiation	Gone for investigation	Use protective equipment	Average percentage
Yes	72.3%	76.9%	78.5	75.9%
No	27.7%	23.1%	21.5	24.1%

Table: 8 Knowledge, perception and practice of non technical staff

Knowledge				
	Heard about Radiation	Explained by doctor	Dose of radiation	Average percentage
Yes	81.2%	52.1%	27.1%	53.46%
No	18.8%	47.9%	72.9%	46.53%

Perception			
	Harmful to body	Should told by doctor	Average percentage
Yes	64.6%	64.6%	64.6%
No	35.4%	35.4%	35.4%

Practice						
	Gone for investigation	Practice radiation protection	Sit near source	Hold sick patient	Had given protection equipment	Average Percentage
Yes	70.8%	43.8%	37.5%	60.4%	56.2%	53.74%
No	29.2%	56.2%	62.5%	39.6%	43.8%	46.26%

Various studies had documented deficiencies in knowledge among medical students, doctors, paramedics and dentists about their understanding of ionizing radiation or the use of equipment involved in the process.

The study highlights that most of the respondents were from age group 21-25 years (31%), followed by respondents of age group 26-30 years (25%) and 16-19 years (16.8 %), which was similar to other previous

studies conducted by Salih S et al. [10] , Zewdneh D et al. [11] and Illian SL et al. [12].

There were many departments working in the hospital for the providing promotive, preventive and curative services. The technical staffs working in the hospitals, according to this study, were Physicians (15.9%), Health Assistants (12.4%), Nurses (10.5%) and radiographer (1%) and other medical staffs (26.6%). The remaining were non technical staffs (33.6%). There was coordination between the staffs of various departments and the radiology department, which did not match the study conducted by Moifo et al. [13].

In the study, maximum of the total respondent thought that they were not in risk of radiation hazard (30.7 %). The reason for this was the lack of awareness about the radiation hazards among the staffs. The respondents who strongly agreed were 26.7%, very strongly agreed (23.8%), moderately (9.9%) and little agreed (8.9 %). This study did not follow the study conducted by Mojiri et al [14] and Illian et al [12].

In this study, the relation between staff and their knowledge regarding the risk of radiation was studied, where, 36.9% of technical staff agreed they were very strongly in risk of radiation, followed by 41.5%, 13.8%, 6.2%, who strongly, moderately and little agreed respectively. 1.5% did not agree that they were in risk of radiation. Whereas among the non technical staffs 83.3% of agreed that they were not in risk of radiation followed by 13.9% and 2.8% who agreed that they were in little and moderate risk. This shows that knowledge about radiation hazards was lesser among non technical staffs in the hospitals.

43.2% of non technical respondents have the knowledge of radiation hazard and were practicing the radiation protection and 45.5% of respondents didn't have the knowledge of radiation hazard but also they were practicing radiation protection methods.

In this study, 53.8% strongly felt the awareness of impact of radiation, 35.4% were slightly moderate and 10.8% were not aware of impact of radiation. It did not match the study conducted by Krille et al. [15].

The study showed that 72.3% of respondents of technical background discuss about the risk of radiation with patient which was similar to a study conducted by Moifo et al [13]. It showed that there was a gap between the patient and the technical person regarding the information of risk of radiation. This gap should be filled to provide the information of risk to avoid from the radiation hazard.

In this study, 78.5% were practicing the protective equipment in radiologic investigation which did not match with the study conducted by Salih et al [10]. This showed that the concern and knowledge of radiation protection were high in this study. Most of the respondent in this study used lead apron (75.4%) during the exposure followed by thyroid shield (35.4%), lead goggles (30.8%), lead gloves (30.8 %), gonard shield (12.3%) and other protective materials (12.3%) like lead barrier, which was very similar to the study conducted by Rahman et al [16].

Most of the respondents had heard about the radiation (81.2%). Among them only 64.6% thought that it was harmful to body. Around 64.6% thought that need of the radiograph should be told by the referring personnel

which did not match with the study conducted by Ricketts et al [17]. It had been shown that 56.2% of the respondents had been given the radiation protection material by the radiology staff. Among non medical staffs in the hospital nearly half of the respondents practice the protective measures for radiation, (43.8 %).

Even non-technical staffs had a little knowledge about radiation, but they were interested to see how radiations were produced and how the images were formed, due to these reasons they wanted to sit near the sources of the radiation. It was seen that 37.5% of non-technical staffs like to sit near the source of radiation and 60.4% of non-technical staff in a hospital attained the uncooperative patient during exposure. Received radiation dose have direct relation with the health hazard. So, the information about the dose of the radiation should be said by the referring physicians. In this study it was seen that 27.1% of the patients were informed by their referring physicians.

CONCLUSION

This study concludes that overall knowledge of radiation exposure from medical imaging and its risks amongst technical and non-technical staffs were average.

The poor perception among the non-technical staffs about the justification of practices, radiation and its hazards was found. Maximum technical staffs were practicing the protecting equipment where as only half of the non-technical staffs were practicing for protective equipment.

The average awareness was found about radiation among technical and non-

technical's employees in hospitals of Nepal. Education was the most important factor to create awareness by medical and non medical person among patients and prevent unnecessary radiological examinations and those who were close relation with the radiation like the staff of operation theatre working in fluoroscopy.

Training in radiation protection and the introduction of guidelines for the proper use of imaging tests adapted to our environment could improve the justification and prescription of irradiating examinations. Regular training programmes and National legal law should be processed to reduce malpractice in radiations in developing countries like Nepal to reduce the hazardous effects of radiation of human health.

LIMITATIONS OF THE STUDY

This study was mainly focused in the radiological department of any hospital settings and covers only staffs that are directly or indirectly related to radiology department. So, it cannot be generalized to whole population.

ACKNOWLEDGEMENT

Authors wish to express their sincere thanks to Zonal Hospital, Janakpur, District Hospital, Palpa and City Hospital, Janakpur, Nepal for their sincere support and cooperation during this research. It will be truly injustice, if we miss to acknowledge Mr. Satyam Prakash, Assistant Professor, Department of Biochemistry, Janaki Medical College Teaching Hospital, Janakpur, Nepal for his intellectual discussions and valuable suggestions during the preparation of this manuscript.

AUTHOR'S CONTRIBUTION

RKJ- Data Collection, data analysis and preparation of first draft of manuscript; **RN**- Literature search and revision of the manuscript prepared; **US**- Concept of study, supervision and final approval of the manuscript.

SOURCE OF SUPPORT: Nil

CONFLICT OF INTEREST: None Declared

REFERENCES

1. United Nations Scientific Committee on the Effects of Atomic Radiation. UNSCEAR 2000 Report to the General Assembly; Vol 1. Annex D: Medical Radiation Exposure. Sources and Effects of Ionizing Radiation. New York: 2000.
2. Brant WE, Budathoki TB, Pradhan R. Radiology in Nepal. Am J Roentgenol 1996; 166: 259- 62.
3. Padhy AK. Nuclear Medicine in Nepal and the 22nd All Nepal Medical Conference. World Journal of Nuclear Medicine 2005; 4(2): 143-4.
4. Dixit H. Nepal's Quest for Health. 3rd ed. Kathmandu: Educational Publishing House; 2005.
5. Muhogora WE, Ahmed NA, Almosabihi A, Alsuwaidi JS, Beganovic A, Ciraj-Bjelac O et al. Patient Doses in Radiographic Examinations in 12 Countries in Asia, Africa, and Eastern Europe: Initial Results From IAEA Projects. Am J Roentgenol 2008; 190(6): 1453-61.
6. http://whqlibdidc.who.int/searo/-1984/SEA_Rad_99.pdf.
7. <http://www.aapm.org/meetings/amos2/pdf/48-14351-62419-242.pdf>.
8. <http://www.thehimalayantimes.com/fullNews.php?headlin=Radiation+safety+in+Nepal++Strong+measures+called+for&NewsID=247025>.
9. Salih S, Zeidan AZ, Alzalabani A, Albadrani SM, Yousef M. Awareness and Knowledge Towards Ionizing Radiation Hazard Among Medical Students, Interns and Residents in Al-Madinah Al-Munawarah, KSA., Life Sci J 2014; 11(3).
10. Zewdneh D, Dellie TS, Ayele T. A Study of Knowledge & Awareness of Medical Doctors Towards radiation exposure risk. IOSR Journal of Pharmacy and Biological Sciences (IOSRJPBS); 2012; 2 (4): 01-05.
11. Illian LS. Physician assistant knowledge of patient radiation exposure from diagnostic imaging modalities. The University of Toledo 2011.
12. Moifo B, Edzimbi L. Referring Physicians' Knowledge on Justification of Medical Exposure in Diagnostic Imaging in a Sub-Saharan African Country, Cameroon. Open J Radiol 2014; 4: 60-68.
13. Mojiri M, Moghimbeigi A. Awareness and attitude of radiographers towards radiation protection, J Paramed Sci 2011; 2(4):2-5.
14. Krille, L, Hammer GP. Systematic review on physician's knowledge about radiation doses and radiation risks of computed tomography. European J Radiol 2010; 76(1):36-41.
15. Rahman N, Dhakam S, Shafqut, A, Qadir, S, Tipoo, F. Knowledge and practice of radiation safety among invasive cardiologists. J Pak Med Assoc 2008; 58(3): 119-22.
16. Ricketts ML, Baerlocher MO, Asch MR, Myers A. Perception of Radiation Exposure and Risk among Patients, Medical Students, and Referring Physicians at a Tertiary Care Community Hospital. Radiology Residency Training Program, University of Western Ontario, London, Ontario, Canada.

Correspondence to:

Rakesh Kumar Jha
Radiotechnologist
Shukraraj Tropical and Infectious Disease
Hospital, Teku, Kathmandu
Email: rakeshjnp@gmail.com