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Knowledge Regarding Risk in Radiation Exposure among Health Care Professionals at a Tertiary Care Centre

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ABSTRACT

Background: The occurrence of the adverse effects of x-rays among the pioneers of radiology had triggered scientific research in radiation protection. The present study was conducted to assess the level of knowledge of radiation hazards among health care providers and professionals who are exposed to radiations during diagnostic and treatment procedures.

Methodology: The study consisted of a questionnaire survey evaluating knowledge, awareness and concern regarding radiological exposure among 30 health care providers and professionals i.e. nurses, doctors, medical technicians, assistant and other staff.

Results: The present study reported that among the subjects 10 assist or carry out radiological procedures several times in a month, 19 more than five cases a week and 7 several times in a day, thus exposing themselves to radiation during radiological examination. 24 of study subjects reported that radiological diagnostic examinations can increase the risk of cancer development in patients in future. 28 of subjects wear lead aprons, 13 shields as radiation protection measure and 18 maintain distance from source of radiation exposure and 3 subjects were not taking any protection measure.

Conclusion: It is crucial to understand for medical professionals that even though radiological investigations are

valuable, they represent a small but definite potential risk to health through exposure to ionizing radiation. There is a lack of awareness of radiation doses and risk of carcinogenesis, among patients and health care professional. Henceforth, there is a requirement to disseminate information regarding radiation dose and the possible risks to the non- radiology medical community.

Key words: Radiology; Radiation Hazards; X-Ray.

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Article History:

Received: 16-02-2018, Revised: 08-03-2018, Accepted: 27-03-2018

Access this article online

Website: www.ijmrp.com	Quick Response code 
DOI: 10.21276/ijmrp.2018.4.2.089	

INTRODUCTION

Radiological examinations are commonly requested for patients to aid clinical diagnosis.¹ Increasing concern has recently been expressed in the literature that the referring doctor's knowledge of radiation doses incurred during radiological procedures is inadequate. Such information may be particularly relevant when the expansion of imaging technology is considered.² Furthermore, many doctors do not realise how much radiation dosage their patients are exposed to during radiological investigations.¹

Although the risks are small for each individual, the large number of people exposed to x-ray radiation is expected to result in a significant number of related health problems in the future. In addition, it has been identified that healthcare personnel often do not have sufficient knowledge about the risks posed by

x-ray exposure and the measures that should be taken to mitigate those risks.^{3,4}

The pioneers of radiology were exposed to high doses of radiation, leading to various dermatoses, hematological disorders, cataract or cancer diseases. The occurrence of the adverse effects of X rays had triggered scientific research in radiation protection. As a result, personal radiation protective equipment was introduced and legislations were passed that defined the limit values and established regulations for radiological protection of the medical staff and the patient.⁵ The present study was conducted to assess the level of knowledge of radiation hazards among health care professionals who are exposed to radiations during diagnostic and treatment procedures.

MATERIALS AND METHODS

The present study is a questionnaire based cross-sectional study conducted in Department of Radiodiagnosis, Vedantaa Institute of Medical Sciences, Palghar, Maharashtra (India).

Study was conducted on 30 health care professionals using convenience sampling method. The questionnaire survey consisting of closed-ended questions (Table 1) regarding the profession and the knowledge of the basic principles of radiation protection in diagnostics and treatment procedures carried out using radiation.

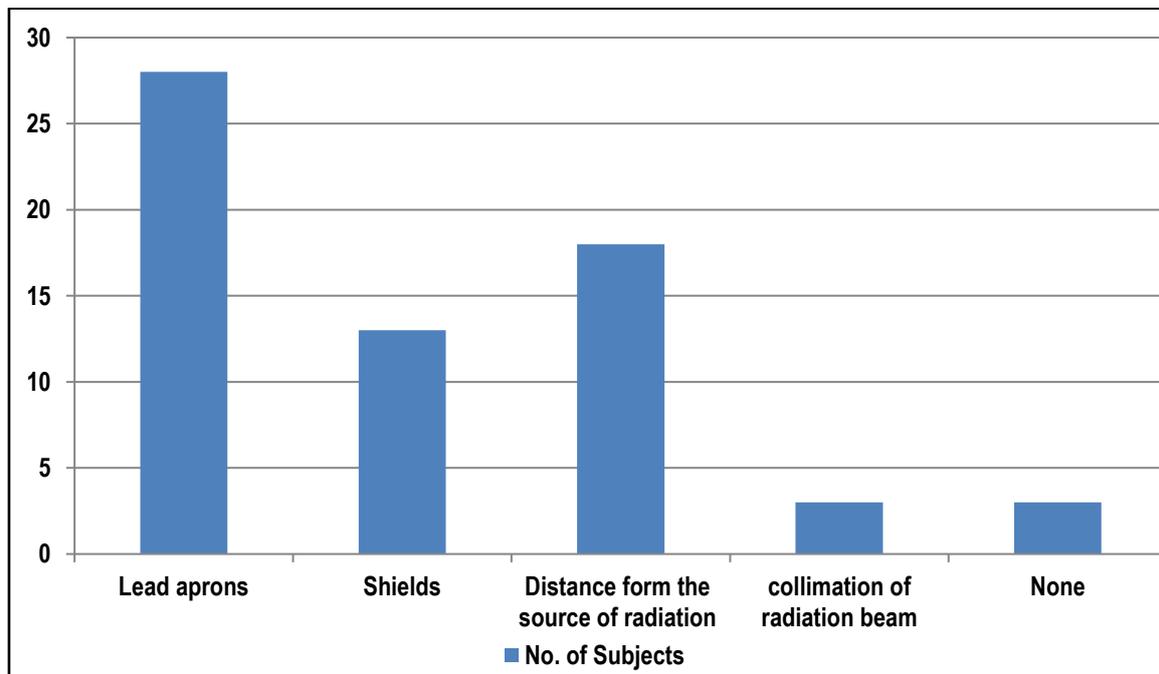
Data was obtained regarding the clinical experience, position, frequency of contact with radiations. The obtained results were subjected to analysis using the appropriate statically analysis.

RESULTS

The results of present study (table 1) found that among the health providers and professionals, who were being exposed to radiation, 11 were doctors, 7 were nurses, 8 were technicians. The present study reported that among the subjects 10 assist or carry out radiological procedures several times in a month, 19 more than five cases a week and 7 several times in a day, thus exposing themselves to radiation during radiological examination. 24 of study subjects reported that radiological diagnostic examinations can increase the risk of cancer development in patients in future. 28 of subjects wear lead aprons, 13 shields as radiation protection measure and 18 maintain distance from source of radiation exposure and 3 subjects were not taking any protection measure.

Table 1: Questionnaire and response of health care professionals.

Question		No.
1. Position of health care professional	Doctor	11
	Nurse	7
	Technician	8
	Assistant	4
2. Do you agree to being exposed to radiation	Yes	30
	No	0
3. No. of times you assist or carry out radiological examinations of patients	Several times a day	7
	More than five cases a week	19
	Several times a month	10
4. Do you think that radiological diagnostic examinations can increase the risk of cancer development in patients in future?	Yes	24
	No	1
	Not answered	5
5. Awareness regarding radiation protection measures	None	3
	Lead apron	28
	Shields	13
	Distance from the source of radiation time of exposure	18
	Collimation of the radiation beam	3
6. Do you think you have adequate knowledge regarding radiation protection measures	Yes	16
7. Do you move out of the operating room when the radiation was being used,	Always	21
	Sometimes stay	9
8. Attitude regarding information to the patients referred for radiological investigations involving ionizing radiation about possible risks.	Strongly disagree	3
	Disagree	4
	Unsure	16
	Agree	5
	Not answered	2
9. Are possible risks of radiation to patients?	Never	8
	Sometimes	5
	Most of the time	10
	Always	3
	Not answered	5



Graph 1: Radiation protection measures used by study participants

DISCUSSION

Present study found that subjects working in the radiology department lack proper knowledge of radiation exposure from medical imaging. Radiation exposure should always operate under the As Low As Reasonably Achievable (ALARA) principle and as opportunities do exist in the radiation field for collective dose reduction, both by reducing the numbers of scans and by reducing the doses per scan. Thus, the present study found that health care professionals underestimate radiation exposure of frequently used diagnostic imaging and the associated risks. 24 of study subjects reported that radiological diagnostic examinations can increase the risk of cancer development in patients in future. 28 of subjects wear lead aprons, 13 shields as radiation protection measure and 18 maintain distance from source of radiation exposure and 3 subjects were not taking any protection measure. Zhou GZ et al⁷ conducted survey among medical students enrolled at a Western Australian university and interns from three teaching hospitals in Perth, of the 17 questions assessing knowledge of ionizing radiation, a mean score of 6.0 was obtained by respondents (95% CI 5.8–6.2). Up to 54.8% of respondents underestimated the radiation dose from commonly requested radiological procedures. Keijzers GB et al⁸ evaluated knowledge of radiation doses associated with diagnostic procedures among doctors at emergency department and found that most doctors reported to have never attended any formal training on risks to patients from radiation exposure and over three-quarters of doctors underestimated the lifetime risk of fatal cancer attributable to a single computed tomography scan of the abdomen. Mubeen SM et al⁹ A study conducted on medical students by showed nearly 40% of the students accepted that objects in the X-ray room emit radiation after an X-ray procedure and nearly the same percentage agreed that protective measures should be taken while performing an ultrasound. Bosanquet DC et al¹⁰ investigated knowledge of the use of ionizing radiation and whether there has been any change in this

knowledge since the study was first undertaken over 7 years ago and it was concluded that in spite of evidence of some improvement, doctors of all grades still have a very poor knowledge of radiation exposure even with the most common investigations. The worsening appreciation of the radiation involved in CT scanning is especially worrying considering its increasing use in practice today.

Kew TY et al¹¹ assessed knowledge regarding medical radiation exposure and its associated risks among non-radiology doctors and reported that there was a lack of awareness of radiation doses and risk of carcinogenesis and there is a need to disseminate information regarding radiation dose and the possible risks to the nonradiology medical community.

It is pivotal that doctors who recommend imaging should be sure that whether diagnostic imaging is required, moreover also have a precise knowledge of the associated risks, especially in the emergency department, where many radiological imaging tests are requested due to time-pressured environment.⁸ Staff should receive education, and the diagnostic imaging request process may need to include information on radiation doses and risks. It is important that medical personnel working in radiology, nuclear medicine and radiation oncology that may contain radiation exposure should use ring badges, whole body film badges and/or TLD badges to avoid excessive radiation dose.¹¹

CONCLUSION

It is crucial to understand for medical professionals that even though radiological investigations are valuable, they represent a small but definite potential risk to health through exposure to ionizing radiation. There is a lack of awareness of radiation doses and risk of carcinogenesis, among patients and health care professional. Henceforth, there is a requirement to disseminate information regarding radiation dose and the possible risks to the non- radiology medical community.

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Source of Support: Nil.

Conflict of Interest: None Declared.

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Cite this article as: Kirtikumar Kantilal Shah. Knowledge Regarding Risk in Radiation Exposure among Health Care Professionals at a Tertiary Care Centre. *Int J Med Res Prof*. 2018 Mar; 4(2):385-88. DOI:10.21276/ijmrp.2018.4.2.089