ORIGINAL ARTICLE

Radiation Risks and Protections Associated with Imaging Modalities

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ABSTRACT

Aim: To explore the awareness of healthcare professionals about risk factors of radiation exposure.
Methodology: This cross-sectional study was conducted in Lahore general hospital for the period of May 2018 through June 2019. Systematic Non probability consecutive sampling technique was used in this study. Medical students, house officers, and postgraduate trainees were included in the study. 712 participants were included in the study. A pre-designed pre-tested questionnaire was used for data collection.
Results: Response rate of this study was 89.6%. So our research was directed to 638 participants, among them, there were 221(34.6%) house officers, 167(26.2%) postgraduate students (PG), and 145(22.7%) medical students of final year and 105(16.3%) medical students of 4th year. 381 (59.7%) participants were female and 257(40.3%) were males. Mean age was 24±8 years. Participants were asked to self-assess their awareness on risk of radiation exposure. In this study, 139(83%) out of 167 house officers self-assessed and have very good knowledge. Among postgraduate students, 173(78.2%) out of 221 have the best knowledge about radiation risk awareness.
Conclusion: It is concluded that the knowledge about the risk of radiation in medical students of 4th and 5th year is limited than the post graduates and house officers.
Keywords: Radiation, X-ray, Imaging technique

INTRODUCTION

Radiation has harmful biological effects on mankind depending on the radiation dosage and the period of contact[1]. Radiological imaging turns out to be an accepted practice clinically, with increasing concern regarding radiation-related threats associated with many imaging modalities[2]. In another study, diagnostic X-rays lead to seven hundred cases of cancer patients annually in the United Kingdom[3]. The number of CT scans increased from one scan to five scans during a period of 1997 to 2013[4]. It is important that healthcare professionals are sentient of the radiation exposure related to diagnostic imaging procedures including CT scan, MRI and X-ray. An analysis reveals that health care professionals have limited information about radiation dosage and the dangers associated with medical imaging investigations[5]. Studies have emphasized the value of radiation-related knowledge[6].

METHODOLOGY

This cross-sectional study was conducted in Lahore General Hospital for the period of May 2018 through June 2019. Non probability consecutive sampling technique was used in this study. Medical students, house officers, and postgraduate trainees were included in the study. Students of Allied Sciences and nursing students were excluded from the study. Medical classes with rotations in radiology department were selected i.e. fourth and final year medical students. 712 participants were included in the study. A pre-designed pre-tested questionnaire was used for data collection. The questionnaire comprised of demographic details and questions to assess the information of participants on radiation exposure. A 21 item survey was administered. The 1st segment of the questionnaire (7 questions) was related to the participants' demographic profile, knowledge of radiation and its significance. The study was initiated after approval from research ethics committee of the institute. Informed verbal consent was obtained and participants were explained the purpose of the study. Descriptive statistics were provided for the radiation knowledge score. Mean scores were analyzed by means of unpaired t-test and significance was set at $p< 0.05$. All statistical analyses were carried out using SPSS version 23.

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RESULTS

The detail of results is given in tables 1 and 2. 712 participants were selected for this study. But we received the response of 638 participants, with a response rate of 89.6%. So our research was directed to 638 participants, among them, there were 221(34.6%) house officers, 167(26.2%)postgraduate students (PG), and 145(22.7%) medical students of final year and 105(16.3%) medical students of 4th year. 381(59.7%) participants were female and 257(40.3%) were male participants. In this study, 139(83%) out of 167 house officers self-assessed that they have very good knowledge. Among postgraduate students 173(78.2%) out of 221 claimed to have very good knowledge about radiation risk awareness. Final and 4th-year medical student response was 44.8% and 42.8% respectively.

Table 1:

Gender	**n**	**%age**
Male	257	40.3
Female	381	59.7
Groups		
Medical students (final year)	145	22.7
Medical students (4th year)	105	16.4
Post graduates	167	26.2
House officers	221	34.6

Table 2: Percentage of Participants Correctly Identifying, Under estimating or Over estimating Relative Doses of Imaging Modalities

Designations	Responses about knowledge (%)	CT abdomen	MRI brain	Abdominal ultrasound	X-ray lumbar spine	Ultrasound kidneys	Mammography
Post graduates n=167	underestimated	0	13(7.8%)	11 (6.5%)	5 (2.9%)	2 (1.2%)	0
	Correct	28 (17%)	23 (13.7%)	16 (9.5%)	44 (26.3%)	30 (22.7%)	31 (18.5%)
	Overestimated	139 (83%)	131 (78.5%)	140 (83.8%)	118 (70.6%)	131 (79.6%)	136 (81.4%)
House officers n= 221	underestimated	21 (9.5%)	17 (7.5%)	20 (9%)	16 (7.2%)	13 (5.8)	10 (4.5%)
	Correct	27 (12.3%)	33(14.9%)	39 (17.6%)	48 (21.7%)	37 (16.7%)	35 (15.8%)
	Overestimated	173(78.2%)	172 (77.6%)	162 (73.3%)	157 (71%)	171 (77.3%)	176 (79.6%)
Medical students (Final year) n= 145	underestimated	21 (14.5%)	24 (16.5%)	15 (10.3%)	25 (17.2%)	22 (15.2%)	19 (13.1%)
	Correct	59 (40.7%)	60 (41.3%)	49 (33.8%)	47 (32.4%)	51 (35.2%)	57 (39.3%)
	Overestimated	65 (44.8%)	61 (42%)	81 (55.8%)	73 (50.3%)	72 (49.6%)	69 (47.6%)
Medical students (4th year) n=105	underestimated	19 (18.1%)	21 (20%)	17 (16.1%)	18 (17.1%)	18 (17.1%)	23 (21.9%)
	Correct	41 (39%)	45 (42.8%)	51 (48.5%)	49 (46.7%)	51 (48.6%)	43 (40.9%)
	Overestimated	45 (42.8%)	39 (37.1%)	37 (35.2%)	38 (36.2%)	36 (34.2%)	39 (37.1%)

DISCUSSION

It is necessary for the future physicians, medical students, and post graduate students that they completely know the extent and effects of radiation dosages and hazards that attend common imaging studies. Certainly, the significance of this matter is redirected in the initiative towards suitable use of medical imaging as well as the extensive acceptance of radiation safety principles. Radiation analytic and therapeutic methods are USG, CT scan, MRI, Nuclear medicine and x-ray. Usage of ionizing radiation in medical field has enlarged sideways with radiation dangers in patients and health employees. Medical and dental x-rays are now main man-made sources of radiation contacts.[7] Research on doctors' awareness of radiation contact and related risks have confirmed constant underestimation of dosage related with numerous imaging studies[8]. A research of 130 physicians in the UK established that 97% undervalued the radiation quantity of common imaging studies[12].

In our study, 139(83%) subjects out of 167 post graduate respondents having very good knowledge about CT abdomen. Among house officers, 173(78.2%) subjects out of 221 claim having the best knowledge about CT abdomen. Final and 4th year medical students response was 44.8% and 42.8% respectively. A study of 331 Australian medical students exposed that 59% underrated this risk[9].

In a Hong Kong study, 5% and 15% of the 80 medical students and physicians believed that abdominal MRI and abdominal USG contain the usage of ionizing radiation[10]. Similar results are seen amongst 331medical students in an Australian study exposed that 11% and 26% wrongly thought that ultrasound and MRI, respectively, involve the use of ionizing radiation[9]. In our work, the knowledge about MRI of post graduates, house officers, final year medical students, and 4th year medical students was 78.5%, 77.6%, 42%, and 37.1% respectively.

Regarding ultrasound of kidney, 79.6% post graduates claim that they have very good knowledge about its risk and side effects. House officer's response was 77.3%, final year and 4th year medical students' 49.6% and 34.2% respectively. An Irish study of 670 medical students found incremental development of students' information through growing years in medical school. These results showed the significance of training on radiation guard, which has been exposed to yield an important development in information of radiation risks[11].

CONCLUSION

It is concluded that the knowledge about the risk of radiation in medical students of 4th and 5th year is limited than the post graduates and house officers.

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