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APPRAISAL OF THE RADIATION SAFETY PRACTICES IN JAMMU AMONG RADIOGRAPHERS IN JAMMU.

Radiology

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ABSTRACT

Aim: The aim of the study was to assess the knowledge and implementation of the radiation protection practices among radiographers in Jammu

Materials and Methods: The study was a prospective cross sectional survey. Convenience sampling technique was used to select radiographers who work in Department of radio diagnosis and imaging of **SMGS JAMMU AND GMC JAMMU**, conducted during the period from August - October 2016, through self administered questionnaires.

Results: Average score on assessment of knowledge was 78.42%, and implementation of those practices was 56.5%.

Conclusion: Radiographers in the hospitals demonstrated a good knowledge of hazards associated with the use of ionising radiation and also of protection mechanisms , however, protection practices were found to be average.

KEYWORDS

radiology, exposure, barrier

INTRODUCTION:

Medical uses of ionising radiation now contribute >95% of manmade exposure and now ranks only second to natural background radiation.3,4Unbridled exposure to ionising radiation had been scientifically proved to cause damages to living tissue in the form of (deterministic effects) and (stochastic effects) 2 the goal of radiation protection is to prevent deterministic and to reduce stochastic effects in exposed persons to a degree that is acceptable in relation to the benefits to the individual and to society from the activities that generate such exposure.9 Compliance to safe work and radiation protection practices mitigates the risks of somatic and genetic changes caused by ionizing radiation1. it has been seen that about 3.6 billion imaging studies per year are carried out world-wide, which has lead to an increase of 70% in worldwide collective effective dose for medical diagnostic procedures.5 Radiation protection is described as all activities directed towards minimising radiation exposure of patients and personnel during x-ray exposure.6 Based on the understanding of these fundamental principles, only those individuals, who derive maximum benefits from such exposures to ionising radiation (justification), should be exposed. It should be ensured that radiation doses resulting out of medical exposures are only enough to achieve needed diagnoses (optimisation).7

MATERIALS AND METHODS:

This preliminary descriptive cross sectional study was carried among 75 radiographers (n=75) who worked in the Department of radio diagnosis and imaging of SMGS JAMMU AND GMC JAMMU, using convenience sampling technique. Students on clinical postings, radiographers who are engaged in administrative duties, Ultrasonography, Computed tomography (CT) and magnetic resonance imaging (MRI) were not included in study**.** The study was conducted through a well structured self-administered questionnaire consisting of three parts; Socio- Demographic data: Age, Gender, Level of and work experiences (Table 1), Knowledge regarding Radiation safety Practices (14 questions) (table 2) and implementation of those radiation safety practices (8 questions), (table 3) Semi-structured, self administered questionnaires were used in collecting data. An inventory was taken of all radiation protection kits such as lead rubber aprons, gonad shields etc and personnel radiation monitors such as film badge dosimeters in the centers before data collection began... Knowledge was assumed to be poor if respondents' average score on fourteen questions used to assess knowledge is less than 50%. Radiation protection implementation was assessed by use of radiation signs during exposures times, wearing of TLD badges, using of protective equipment during work such as lead shield, gonad shields, thyroid collar, lead gloves and light beam diaphragm (LBD). Their radiation protection practices were assumed to be poor if basic radiation protection kits such as lead rubber aprons, gonad shields, personnel radiation monitors such as film badges etc are lacking in the centers.

RESULTS:

Aa total of 75 radiographers responded to this study, with the age range of 20 year and 60 years, with 41 males and 34 females. 41of them were Diploma holders, 34 with higher degree. (Table 1). Regarding knowledge in this study, as seen in table 2 and graph 1, 74 of the respondents knew that doors and walls consist of isolated materials such as lead. 98.7% of the staff has periodic radiation dose check from their TLDs (wearing TLDs during their work hours). Respondents when asked about amount of annual dose limit for individuals and data analysis show that the majority of workers had correct answer (more than 75%). About 33 of them knew the radiation doses associated with commonly requested investigations (44%) answered with yes, while high proportion of respondents did not know about it (56%). Majority of respondents knew that Use of High KV Reduces Skin absorbed Dose i.e. about 78.6%. 50.6% of the radiographers had knowledge about justification and optimization. About 40% of the respondents knew that the operating procedures and local rules must be written down somewhere. 52% of the radiographers knew that quality analysis is an essential part of radiation protection and was conducted in these hospitals, every 3 years. All the radiographers made it sure to ask about pregnancy history in female patients of childbearing age. 74.6% of the radiographers knew that personnel and environmental radiation monitoring is indispensable. About 60% of the respondents gave explanation of procedures to patients or their attendants before exposures. All of the radiation workers sought patient consent before exposing them to the radiation. It was encouraging to observe that about 93.3% enquired about the origin of radiographic examination requests from the patients who came for the procedure. As far as implementation of the practices was concerned it was observed, as seen in table 3 and graph 2, that 93.3% of the study participants wore lead apron during work while 6.7% did not. The obtained results show 98.7%, of who participated in this study adhere to Radiation Protection Guidelines. Respondents Using light beam diaphragm and other protective devices (cone & grid) have percentage of 78.7%, while 61.3% were using wall shield during exposures, radiation signs during working hours with 57.3%, further, only 22.7% used lead gloves In spite of excellent knowledge found among radiographers in this study, only 25.3% using gonad shields during work. Percentage of application shield for patients and themselves among the participants was significantly higher 78.9% and 83.1%. According to data analysis, there was no significant relation between awareness of Radiation safety, performance and work experience.

DISCUSSION:

The level of the knowledge among the respondents can be assessed by the fact that 59 out of the 75 respondents answered At least 10 out of the 14 asked questions correctly. Knowledge was assumed to be poor if respondents' average score on fourteen questions used to assess knowledge is less than 50%. Since a respectable number of the radiographers i.e. about 78%, demonstrated sufficient knowledge

about the radiation safety practices, it can be gauged that the radiographers had good knowledge about their profession**.** It was observed that 93.3% of the study participants wore lead apron during work while 6.7% did not and justified their non compliance by various reasons such as non availability of enough numbers of lead aprons in their departments or increased weight of apron and some of them preferred to follow position-distance rule rather than wearing lead apron. The majority of them use film-badge in order to detect their Occupational

Absorb Dose. They also follow periodical examination as a healthy behaviour. Most of them are familiar with radiation effects and it is possibly due of continuing study around radiation course. The radiographers' information about personnel protection devices was proper especially for lead apron, thyroid shield, gonad shield, and all shield and radiation signs. It is mandatory, according to International Commission on Radiation Protection (ICRP) radiation safety standards, for gonads shields to be used for the protection of the gonads when the pelvis is not part of the anatomical area being examined. Adherence to radiation protection practices among radiographers the in the hospitals during the period studied was, however, fair. Radiographers in the Hospital exhibited a very good understanding of the issues pertaining to radiation protection. They scored an average of 74% in the assessment of their radiation protection knowledge which was found to be good. Of particular interest is respondents' understanding that only a consultant radiologist should statutorily request the repeat of all presumably suboptimal radiographs, including paediatric cases. This agrees with international requirement on radiation protection. Optimisation of exposures, for instance, is a function of in-depth knowledge and adherence to written down operating procedures. While it is conceded that most radiographers, by reason of their training, job experience and continuous professional development are usually conversant with optimal exposure factors in their centres, some, especially the newly employed ones may not be. This, therefore, makes availability of written exposure charts indispensable especially in these hospitals where manual selection of exposure factors is still in vogue. Use of exposure charts reduce selection of sub optimal exposures that often result in repeat of exposures and is, therefore, recognised as radiation protection measure. X-ray machines in the two centres were high output static and mobile types. High output x- ray units are desirable as they allow selection of both high Kilovolts (KV) from 70 Kv and above and short exposure times (milliseconds) needed to reduce both skin and absorbed doses. While protective barriers such as gonad shields, leaded screens and lead rubber aprons were available in all the centres, none of the centres had any special paediatric immobilisers. In spite of excellent knowledge found among radiographers in the study, it was observed that majority of the radiographers appropriately used protection devices while gonad shields were used only when necessary as in case of pregnant ladies. In particular, gonad shields were available in all the centres studied but were either deliberately or inadvertently ignored as lead apron regimen was adequately followed. Personnel radiation monitoring is essential to ensure that annual permissible dose limits are not exceeded. There were no area and air borne radiation monitors in any of the centres studied. Since no radiographer should ever lost thought of radiation protection practices, no radiographer stands the chance of unwittingly exceeding their recommended annual maximum permissible doses of dose limits of 20 mSv averaged over a 5-year period for designated radiation workers.

CONCLUSION:

Within the limitations of study which includes citing an incidence of radiation induced ailments and small sample size, we came to conclusion that the radiographers in the hospitals demonstrated a good knowledge of hazards associated with diagnostic use of ionising radiation and also of protection mechanisms from such hazards. Their knowledge, however, impact of radiation protection practices which were found to be average, furthermore there is also a need for more monitoring of these facilities by the Regulatory bodies.

Table 1 Demographic characteristics among participants

Variable		N (%)
AGE	18-25	13(17.3%)
	26-35	7(9.3%)
	36-45	51(68%)
	46-60	4(5.3%)
QUALIFICATION	Diploma	41(54.7%)
	Bachelors	34(45.3%)
WORK EXPERIENCE	1-5 years	42(56%)
	60-10 years	21(28%)
	11-16 years	3(4%)
	>17 years	9(12%)

Table 2 Knowledge of participants regarding radiation protection during practice, N=75

S. NO	VARIABLE	ANSWER	NUMBER (%)
1.	Do you know that doors and walls consists of isolated materials such as lead for more protection	Yes	74(98.7%)
2.	Do you cooperate on periodic radiation dose check from TLD	Yes	74(98.7%)
3.	Do you know the annual limitation dose for individuals	Yes	56(74.7%)
4.	Do you know what a dosimeter is	Yes	57(76%)
5.	Do you know the radiation doses associated with commonly requested investigation	Yes	33(44%)
6.	Do you know that use of high KV reduces skin absorbed dose	Yes	59 (78.6%)
7.	Do you Have knowledge of justification and optimisation	Yes	38(50.6%)
8.	Do you know that the operating procedures and local rules must be written down somewhere	Yes	30 (40%)
9.	Do you know that quality analysis is an essential part of radiation protection	Yes	39 (52%)
10.	Do ask for pregnancy history in women of child bearing age	Yes	75(100%)
11.	Do you know that personnel and environmental radiation monitoring are indispensable	Yes	56(74.6%)
12.	Do you give explanation of procedures to patients or their attendants before exposures	Yes	45(60%)
13.	Do you request for patients consent before procedure	Yes	75(100%)
14.	Do you enquire about the origin of radiographic examination requests	Yes	70(93.3%)

Table 3 Performance of participants towards radiation protection practices, N=75

S. NO	VARIABLE	ANSWER	NUMBER (%)
1.	Wearing TLD badges daily during work	Yes	74(98.7%)
2.	Wearing lead aprons during working hours	Yes	70(93.3%)
3.	Using light beam diaphragm, cone and grid	Yes	59(78.7%)
4.	Using lead gloves during work	Yes	17(22.7%)
5.	Using wall shield during work	Yes	46(61.3%)
6.	Using radiation signs during working hours	Yes	43(57.3%)
7.	Using thyroid collar during work	Yes	27(36%)
8.	Wearing gonad shield during work	Yes	19(25.3)

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