Original Article

Awareness of Radiation Hazards among Undergraduate Medical Students

Radiation Hazards among Medical Students

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ABSTRACT

Objective: Many studies have been conducted regarding x- radiation hazards but there is lack of studies regarding x- radiation hazards among medical students in Pakistan. Our research aimed to assess the knowledge about imaging associated radiation hazards among medical students.

Study Design: This was a cross sectional descriptive study.

Place and Duration of Study: This study was conducted at the Foundation University Medical College, Islamabad from February 2015 to June 2015.

Materials and Methods: A self-administered close ended questionnaire was distributed among 350 medical students from first year to final year. The obtained data was analyzed using SPSS version 19 statistical software.

Results: Our target population included 350 medical students. 100% students had some idea about hazards of radiation. 99.7% students answered that x-rays are harmful. 93.4% students believed x-rays cause cancer / infertility. 37.7% students thought that x-rays cause nausea, vomiting and sore throat. 96% students replied that x-rays should not be done in pregnant patients. 52% students believed that x-rays are more dangerous than CT scan & MRI. 95.4% students answered that x-rays are harmful for x-ray technicians.

Conclusion: This study concludes that the majority of students of Foundation University Medical College have satisfactory knowledge about radiation hazards and know about means to minimize it. The awareness about radiation hazards among medical students increases as the year of study progress. There is a need to provide more knowledge about risk of radiation exposure to medical students by adding various objectives in curriculum and by ward rotations

Key Words: x-rays, radiations, radiation hazards, awareness, radiology technicians, medical students.

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INTRODUCTION

As the medical technology is evolving, the number of radiological investigations is increasing rapidly. In recent years, many studies have proved that there is increased patient radiation exposuresattributed to increased utilization of diagnostic imaging, particularly computed tomography (CT) [(1)]. Clinicians have to be aware of the risks, benefits and radiation doses so as to provide aprecise explanation to their patients and reduce the incidence of radiation related diseases [(2)].

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In a report by "The US National Council on Radiation Protection and Measurement" it is stated that medical x-rays and nuclear medicine account for 15% of all radiation exposures [(3)]. Similarly, in UK, there is an estimated number of 100-250 deaths that occur each year from cancers directly connected to medical exposure due to radiations [(4)]. It is seen that about 30-50% of medical judgements depend on x-ray imaging results [(5)]. In other words, these investigations are the backbone for diagnosis of several diseases. Hence it is very important that the dose of radiation in any diagnostic procedure should be sufficient to answer the pertinent clinical question but must be as low as reasonably achievable (ALARA) to minimize the risk of developing different diseases [(6)].

Several radiological investigations have harmful effects on human body. All living beings in this world are exposed to different sources of radiations and around 18% radiation is due to man-made source[(7)].X-rays were discovered in 1895, and many years after this discovery radiologists were exposed to such high radiation doses that skin diseases like dermatitis and other radiation-induced injuries were common [(8)]. At that time the effects of radiation induced diseases were not studied in detail.

Various research studies show potentially damaging effects of radiation exposure. It is believed that a linear

relationship exists between radiation exposure and development of cancer[9].

It is responsibility of health care personnel to be well aware of basic knowledge aboutharmful radiation effects and radiation protection soas to minimize x-ray examinations and reduce unnecessary radiation dose to the patient in accordance with ALARA principle (as low as reasonably achievable) [5]. It is useful to note that the main objective of any diagnostic procedure or examination utilizing X-rays, is to produce sufficient quality images so as to provide suitable diagnostic information for clinical use[10]. There is an increasing concern in the literature that regarding that the referring doctor's knowledge of radiation doses gained during radiological procedures is inadequate [11].

Many worldwide studies have been conducted to assess the awareness about radiation hazards among physicians showing dearth of knowledge in physicians. It has been shown that the increasing awareness of radiation hazard among doctors and clinicians can be improved by increasing knowledge of radiation hazards to medical students [5].Literature review has revealed that there is lack of studies on aspect of radiations hazards among medical students in Pakistan [12].

MATERIALS AND METHODS

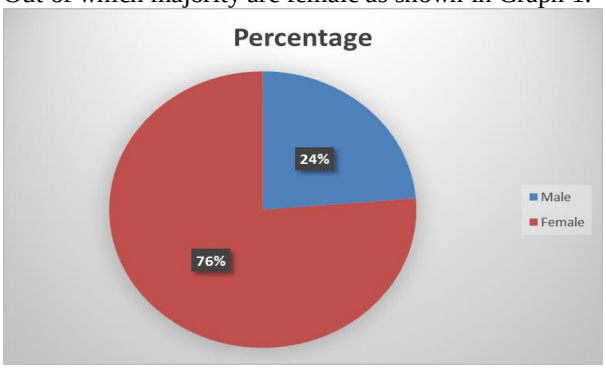
It was a cross sectional descriptive study that was conducted in Foundation University Medical College Islamabad from February 2015 to June 2015.

The confidence level is 95%. Anticipated population proportion 98% and absolute precision required is 1.5% (with the help of WHO sample size calculations).

There were 350 participants. Sampling technique was non-probability. All willing students of FUMC were included in the study. Permission of the college ethical committee was taken prior to conducting the study. After collection of data it was analyzed by using SPSS 19.

RESULTS

Our target population included 350 medical students. Out of which majority are female as shown in Graph 1.



Graph No.1: Percentage of male and female students

The objective of study was to estimate the knowledge & awareness about radiation hazards. 100% students answered that x-rays have hazardous side effects. Most of the students believed x-rays cause cancer and infertility and x-rays should not be done in pregnant patients. Some students thought that x-rays cause nausea, vomiting and sore throat and X-rays are more dangerous than CT scan & MRI. This is depicted in Table 1.

Table No.1: Students understanding about Radiation Hazards

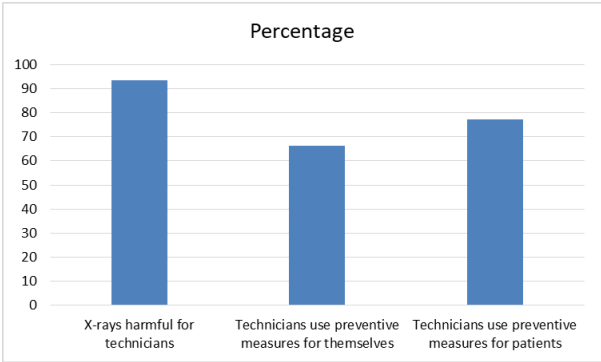
Students' Perceptions about Radiation Hazards	Percentage
X-rays have hazardous side effects	100.0%
X-rays cause cancer and infertility	93.4%
X-rays cause nausea, vomiting and sore throat	37.7%
X-rays should be avoided in pregnancy	96.0%
X-rays are more dangerous than CT/MRI Scans	52.0%

Our study also showed that results improved with number of years completed in medical school; 4th year & 5th year M.B.B.S students appeared to have more knowledge than 1st year, 2nd yearand 3rd year medical students. As revealed in Table 2

Table No.2: Radiation Hazards Awareness in Medical Students

Radiation Hazards Awareness	Percentage
First Year	44.0%
Second Year	57.0%
Third Year	78.0%
Fourth Year	90.0%
Final Year	94.0%

The views of the students regarding X-ray technicians' using preventive measures for themselves and for the patients is shown in Graph no 02.



Graph No. 2: Technicians and preventive measures

DISCUSSION

Everyone is being exposed to ionizing radiations and about 18% of population exposure is due to man-made sources [12].

The Eurotom directive to address radiation protection awareness in 1997 issued by European council states that radiation exposure for medical purpose should yield a net benefit to the patient and society [1].

Many previous studies have shown that there is deficiency of knowledge of ionizing radiation among medical students, doctors and paramedical staff.

The objective of our study was to assess the knowledge of ionizing radiations and their hazards among medical students. Our results show that most of the students of Foundation University Medical College (FUMC) have satisfactory knowledge and awareness about radiation hazards. This study also demonstrates differences or fluctuations in knowledge and awareness of different study years of MBBS. Our study results show that 4th Year MBBS students have the maximum knowledge regarding radiation hazards but as only 50 final year students participated in this study hence this conclusion is indecisive. According to study conducted by Syed Mohammad in Karachi, medical students showed insufficient knowledge about radiation related diseases occurring from different investigations [12]. Lack of knowledge can affect correct medical decisions and can also cause harm. If a doctor is too concerned about radiation hazards and very rarely prescribes x-ray related medical investigations, then he is under-diagnosing many diseases. On the other hand, if a doctor is asking for a lot of x-radiation investigations then he is putting his patients at the risk for developing certain sinister diseases. The doctor must, therefore, have sound knowledge of when to order an investigation and when not to.

A study conducted in Medina by Suleman Shah showed that knowledge of medical students, interns, and residents, about investigations involving X rays was inadequate[5]. While another study conducted in Ethiopia also shows the same results, that is, lack of adequate knowledge about radiation related diseases and how to minimize them [4].

In a study conducted at University of British Columbia, knowledge of final year medical students about radiation hazards was assessed. It was seen that medical students were aware of the importance of radiation related issues to patient care. While almost all students were familiar with radiation free modalities, many underestimated the relative doses and risks of common imaging studies. This may expose patients to increasing imaging investigations and exposure to radiation hazards [13].

Some studies show a consistent inability to correctly identify excess cancer risk as a result of an abdominal CT in an adult; only 12.5 % of 240 doctors surveyed in the UK were correct [14]. Similarly, a survey of 331 Australian medical students revealed that 59% underestimated this risk [15].

The excess of cancer risk is related to ionizing radiation. Because of recent attention to this issue, patients are more likely to express concerns over radiation risk [16]. Education regarding various radiation levels and risks is necessary to decrease patient's anxiety [17].

CT scan use has increased dramatically over the past several decades [18]. CT delivers much higher radiation dose than convectional diagnostic x-rays. A chest CT delivers more than 100 times the radiation dose of a routine frontal and lateral x-ray chest [19,20].

However according to another article published by Radiological Society of North America (RSNA), the risk of cancer is sometimes exaggerated, as the principal data source for the risk factors is the ongoing study of survivors of the Japanese atomic explosions, a population of individuals that is far different form patents undergoing medical imaging [21].

During medical procedures from examination involving radiation, doctors are the main source of information. They have to be prepared for risks, benefits, and doses in order to provide an accurate explanation to their patients. The dose of radiation utilized in any diagnostic procedure should be as low as reasonably achievable to minimize the risk to the patient [6]. To decrease risks to patients, efforts should be put in increasing the knowledge of Doctors regarding radiation effects, risks, doses and patient safety and large-scale studies should be conducted to assess the efforts and to discover any errors.

The curriculum for a medical student involves teaching various subjects that aims specifically at the application of knowledge and problem-solving skills during in a pre-assigned academic period. In Pakistan, medical students undergo their clinical rotation in the department of radiology either in the fourth or in the final year of undergraduate training program. Within the curriculum, the Pakistan Medical and Dental Council has combined six subjects that includes radiology and has allocated a total of 40 hours in five years. Medical students acquire knowledge about the fundamentals of radiology and the interpretation of clinical radio-diagnostics during their rotation in the radiology department. If medical students are not empowered with sufficient and precise knowledge regarding different aspects of radiation, it would be difficult to communicate correct information to the potential radiation recipient [12].

Foundation University Medical College follows a modular curriculum with vertical and horizontal integrations. Radiology is part of the curriculum from first year till final year. However, the learning objectives for first and second year are different from the rest of the classes. In these two years special emphasis is being laid on teaching normal anatomy on X-ray films, CT and MRI scans while touching upon the concept of hazards of radiation. The topic of radiation hazards is further reinforced in the rest of the years.

CONCLUSION

This study concludes that the majority of students of Foundation University Medical College have satisfactory knowledge about radiation hazards and how to minimize them. The awareness about radiation hazards among medical students increases as the year of study progress**.**

There is a need to provide more knowledge about risk of radiation exposure to medical students by adding various objectives in curriculum and by rotations in radiology department. Different seminars / workshops / lectures can be organized for referring physicians and surgeons in order to increase their understanding of radiation hazards and how to minimize them.

Author's Contribution:

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Revisiting Critically:	Kiran Fatima Farooq, Nuwaryrah Jawaid Saghir
Final Approval of version:	Kiran Fatima Farooq

Conflict of Interest: The study has no conflict of interest to declare by any author.

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