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Trends in General Medicine

Assessment of Radiological Staff Awareness Level Related to Ionizing Radiation Hazards and Protective Measures in Hospitals of Kandahar city, Afghanistan

Rahmatullah Afghan[1]*, Ahmad Zaher Ahmadi[1], Mohammad Abdullah Sadiqi[1], Dad Mohammad Behrooz Naasiri[2] and Ahmadullah Melatmal[3]

[1]*Helmand University, Faculty of Education, Department of Physics, Lashkar Gah, Helmand, Afghanistan.*

[2]*Kabul University of Medical Science, Abu Ali Ibnsina, Faculty of Allied Health, Department of Physics, Kabul, Afghanistan.*

[3]*Helmand University, Faculty of Education, Student of Physics Department, Lashkar Gah, Helmand, Afghanistan.*

***Correspondence:**

Rahmatullah Afghan, Helmand University, Faculty of Education, Department of Physics, Lashkar Gah, Helmand, Afghanistan

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ABSTRACT

Introduction: *The use of ionizing radiation in diagnosis and procedural treatment is increasing. Hence, sufficient knowledge and awareness about the hazards of these radiations are necessary for doctors and radiographers in the field using ionizing radiations. Therefore, this study is conducted to evaluate the awareness level of radiological staff.*

Methods: *A quantitative, descriptive cross-sectional study of 100 doctors and radiographers in hospitals from Kandahar, Afghanistan. Questionnaire was completed by doctors and radiographers to obtain data with respect to study. It included demographic information and awareness about ionizing radiation hazards. In addition, multiple choice questions were evaluated in the following domains: Nature of radiation, reduction factors of X-ray, safe distance between X-ray machine and user and sensitive organs.*

Results: *the mean age of the participant was out of 33.3 years (20-50 years). most of the participants were male (81%) and worked as medical doctors and radiographers. Their work experience ranged from (1-10 years). Most of the participants (60%) had medium knowledge and awareness, (38%) low knowledge and awareness (2%) high knowledge and awareness about nature and hazards of ionizing radiation.*

Conclusion: *This study found reasonable level of awareness but insufficient knowledge and mistaken belief about radiation hazards and protection among doctors and radiographers. Therefore, workshops, courses and posters on radiation hazards and protection are recommended.*

Keywords

Radiology, Radiation hazard, Awareness level, Knowledge.

Introduction

Ionizing radiation has become widely used for diagnostic and treatment purposes since the discovery of Rontgen ray in 1895. This increasing usage in the field of diagnoses and treatment has been concerned patients and health care workers with simultaneous radiation hazards [1]. The public receives 2.5 mSv dose of radiation per year on average with 15 % of medical exposure. A high level of this exposure from ionizing radiations can be harmful to the body [2]. To reduce and minimize the risks of ionizing radiation expert professionals should perform imaging procedures. As Low as Reasonably Achievable (ALARA) principles can minimize the exposure rate during imaging [3].

Interventional radiology (IR) is a minimally invasive procedure that uses several types of radiological techniques, such as computed tomography (CT), magnetic resonance imaging (MRI), ultrasound, and X-ray fluoroscopy, as a specifically targeted

therapy. Diagnostic radiology involves a number of specialized fields, such as neuroradiology, pediatric radiology, nuclear radiology, hospice and palliative medicine, pain management, vascular and IR [4]. The hazards to patient safety associated with any radiological operation also apply to interventional radiology (IR) procedures, and all necessary safety measures carried out in the context of other technologies must be followed in IR [5]. Additionally, patients undergoing IR operations run the danger of suffering harm or injury as a result of inadequate precautions taken both before and during the process, as well as any complications or unfavorable results of the related procedures [6].

International commission of radiation protection (ICRP) proposed three main terms; optimization, justification and dose limit. Because health risk of patients involves special considerations. When applied at right dose for a given medical reason, ionizing radiation is a necessary tool that will produce more good than harm, hence dose limitations are completely irrelevant [7]. Consequently, the diagnostic reference level (DRL) is typically employed as a reference value for medical radiation since it lacks dose restrictions [3].

To reduce the hazards of radiation exposure, every medical dose of radiation needs to be justified, and ionizing radiation-using tests need to be optimized. Justification implies that the examination should be valuable and medically appropriate [8]. According to the diagnostic position, optimization implies the use of doses for imaging that are as low as reasonably achievable (ALARA) [9].

Statement of the problem

Despite of important role of radiology in healthcare, there are gaps in the level of awareness among radiology staff in hospitals in Kandahar, Afghanistan, regarding the risks of ionizing radiation and necessary protective measures [10]. However, the lack of awareness creates significant risks to the health and safety of both patients and healthcare workers. Insufficient knowledge about radiation risks and proper safety protocols can lead to radiation exposure, potentially resulting in long-term health consequences for radiology staff [11]. Addressing this issue is crucial for developing radiation safety procedures and ensuring the well-being of all individuals involved in radiological procedures in hospitals of Kandahar City, Afghanistan.

Purpose of the study

The purpose of the study is to evaluate the level of awareness among radiology workers in 11 hospitals of Kandahar City, to examine the cause of their poor performance in health care and the effects of ionizing radiations on human body.

Significance of the study

This study enable us to have knowledge about the hazards of ionizing radiation and how this affects human body. This study therefore helps us to understand protective principles and how to properly utilize the minimum possible dose

Scope of the study

This study sorts to figure out the assessment of radiological staff awareness level regarding ionizing radiation hazards and protective measures in some selected hospitals in Kandahar City for both Government and private hospitals. This investigation does not include all the hospitals in the city.

Research Questions this study addressed the following questions:

- What is the level of awareness among radiology workers regarding the side effects of ionizing radiation and protective measures?
- Have qualified and professional persons been employed in the field of radiology in hospitals?

Materials and Methods

This is a descriptive study conducted to evaluate the awareness level of radiological staff work in OPD branch. A questionnaire was developed to acquire data about the awareness level of radiologists, doctors and nurses from ionizing radiations hazards and their safety. The sample that researchers use comes from 100 health workers in eleven hospitals throughout Kandahar City. The survey form consisted of two sections. First section had demographic explanations such as: age, gender, marital status, work experience, profession, qualification, health status and fear from radiations, while the second section was to figure out the awareness level of the staff using hazardous radiations in the field. Each section includes a certain number of questions used to identify trends in measurement of awareness [10].

In this study the researchers gave I mark for each right as well as wrong answer of the question. Based on the marks the awareness level is divided on three categories: low quantity (0-7) marks, medium quantity (8-14) marks and high quantity (15-20) marks. Than statistical analysis of data were performed using SPSS program to find descriptive statistics. The process carried out include transcription of data in to text and coding, which is operational for achieving descriptions and themes.

Results

A total of 100 participants from different hospitals were distributed the questionnaire, and the response rate was 83.3% (N=120). The questionnaire was fully completed by all responders. The data presenting biographical information of the participants and their responses about awareness level with multiple questions in the survey. The average age of the participants was out of 33.38.6 years (20-50years). most of the participants were male (81%) and worked as medical doctors and radiographers. Their work experience ranged from (1-10 years) results of some health workers' profiles at eleven hospitals in the Kandahar city Centre are given in Table1.

Table 1: Distribution of the demographic features of doctors and Radiographers.

	Doctors	Radiographers	Total Number	Percentage (%)
Sex (n)				
Male	24	57	81	81%
Female	19	0	19	19%
Age(year)				
20-30	17	40	57	57%
31-40	14	11	25	25%
41-50	12	6	18	18%
Marital status				
Single	23	24	47	47%
Married	20	33	53	53%
Qualification				
Bachelor	41	57	98	98%
Master	2	0	2	2%
Profession	43	57	100	100%

Table 2: Distribution of some other features of participants.

	Participants	Total number	Percentage (%)
Fear	yes	100	100 %
Healthy	Normal	100	100 %
Work experience	1-10	80	80%
	21-30	16	16%
	31-40	4	4%

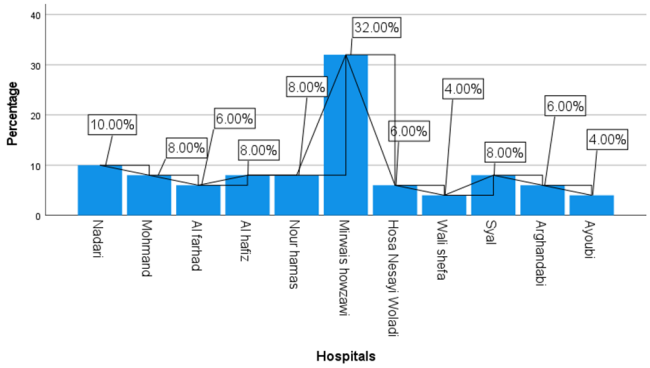

Figure 1: Participation of hospitals staff.

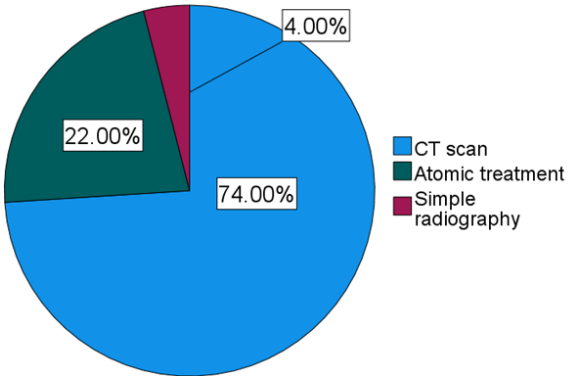

Figure 2: Pie chart demonstrates the count of participants if they know which instruments produces more radiations.

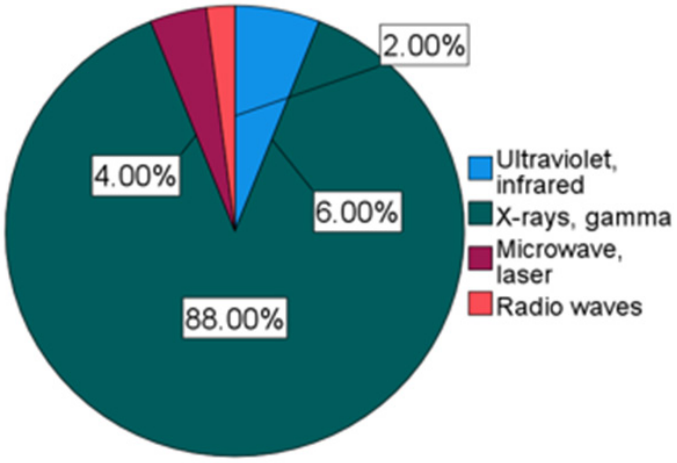

Figure 3: Pie chart demonstrates the count of participants if they know which radiations are ionic.

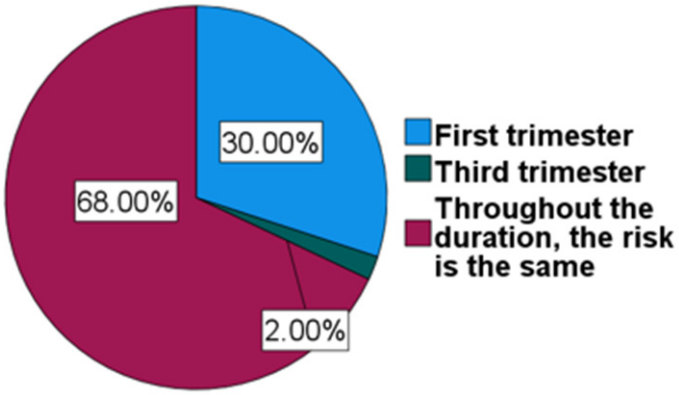

Figure 4: Pie chart demonstrates the count the participants sure about the sufficient awareness about ionizing radiations to pregnant patients.

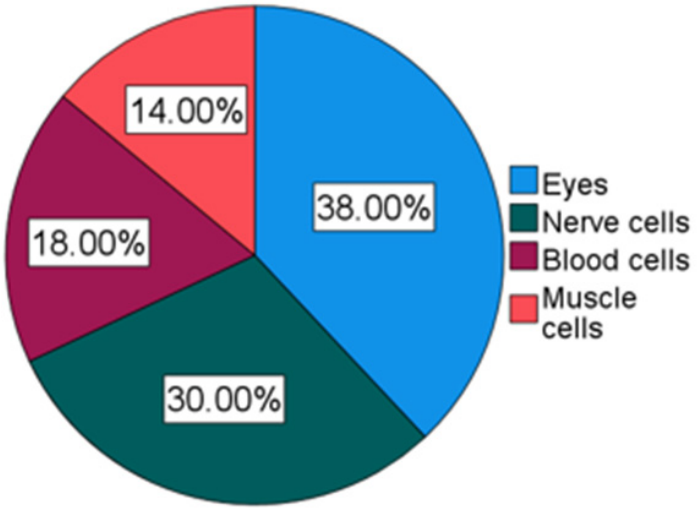

Figure 5: Pie chart demonstrates the count the participants sure which parts of the body are sensitive to radiations.

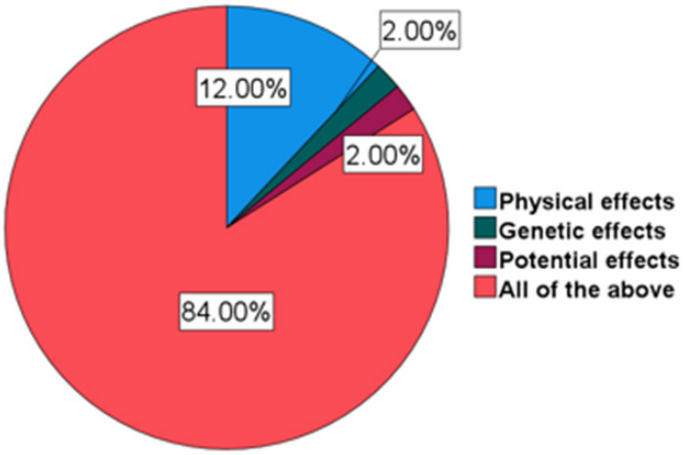

Figure 6: Pie chart demonstrates the count the participants understanding biological effects of radiations on human body.

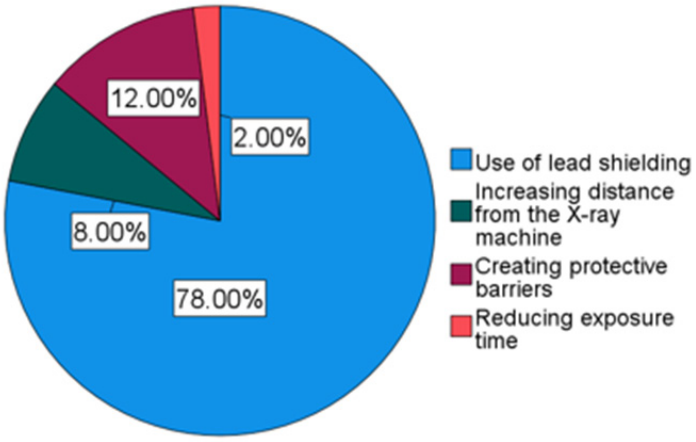

Figure 7: Pie chart demonstrates the count of awareness level of participants about the factors that reduces x-rays.

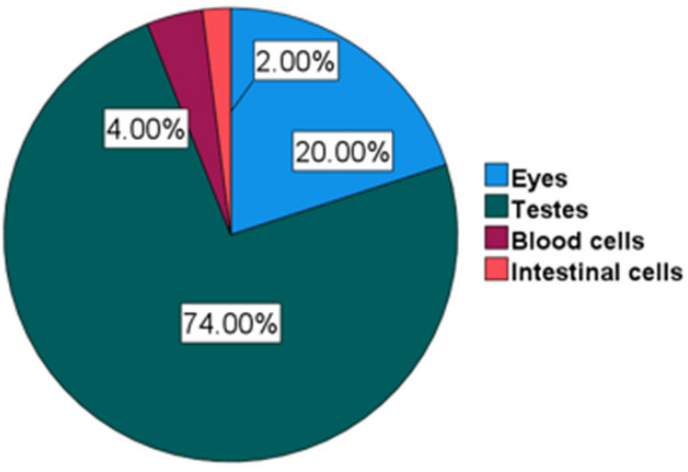

Figure 8: Pie chart demonstrates the count of participants if they know which parts of the body is more sensitive to ionizing radiations.

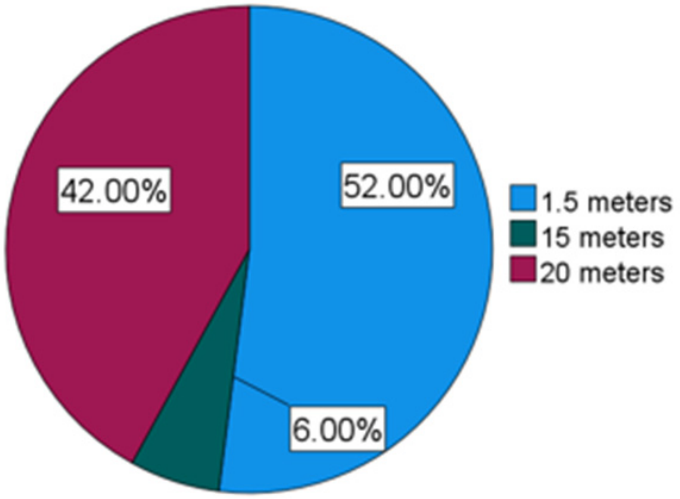

Figure 9: Pie chart demonstrates the count the participants know the portable distance of radiography machine and user.

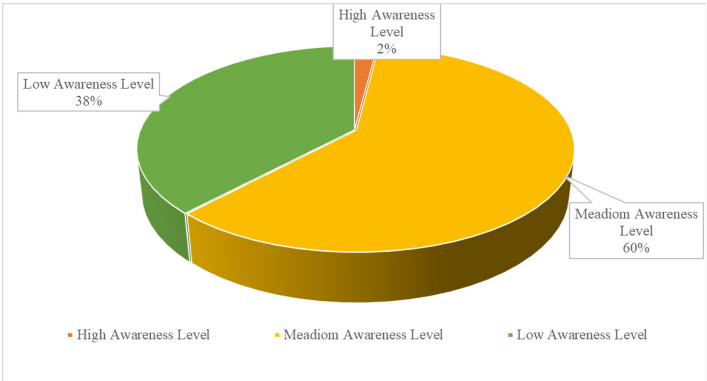

Figure 10: Evaluation of radiological staff awareness level.

Discussion

To the greatest extent of our ability, this study represented the first effort to evaluate knowledge and awareness about radiation hazards and protective measures among doctors and radiographers in 11 hospitals of Kandahar city, Afghanistan. The findings of this study were in contrast with those reported by [11]. Which found that all the staff working in radiography were healthy and have not been exposed by hazardous radiations. Moreover, in their study the majority of nurses were exposed and affected by various types of malignant diseases.

Figure 1 demonstrates participants of each hospital who participated in this survey. Figure 2 shows the count of participant if they have sufficient information about the instruments producing more radiations used in radiography. (74.00%) doctors and radiographers answers CT scan produces more radiation. (22.00%) of the participants expresses atomic treatment and (4.00%) answers the simple radiography. Figure 3 (88.00%) respondents provided and answered X rays and Gamma rays are ionic radiations while (12.00%) had now proper information about ionic radiations. Hence (6.00%) of them answered ultraviolet and infrared, (4.00%)

microwave and laser and (2.00%) radio waves radiations are ionic.

Figure 4 demonstrates (68.00%) of the participants had provided and answered the risk of ionizing radiations are the same in all trimesters to pregnant. (30.00%) and (2.00%) answered first trimester and third trimester respectively. The respondents were confident about the sensitivity of radiation to body more especially (38.00%) expresses eyes are the parts which get serious sensitivity, (30.00%) answered nerve cells, (18.00%), (14.00%) had provided blood cells and muscle cells as answers respectively Figure 5.

Figure 6 demonstrates what are biological effects of ionizing radiations on human body? (12.00%) respondents were sure about physical effects, minority of the respondents (2.00%) provided and answered genetic and potential effects are the main causes of these radiations, while majority of the respondents (84.00%) had answered all of these effects are hazardous to the body. The awareness level of doctors and radiographers about factors reducing X-ray hazards are shown in Figure 7. (78.00%) of the respondents expressed answer for this question (the use of lead shielding), (8.00%) (increasing distance from the X-ray machine, (12.00%) and (2.00%) were sure about (creating protective barriers) and (reducing exposure time) respectively. Figure 8 demonstrates other parts of the body such as: eyes, testes, blood cells and intestinal cells sensitivity to ionizing radiations, (74.00%) respondents expressed their understanding with answer testes, (20.00%) eyes, (4.00%) and (2.00%) less count blood cells and intestinal cells respectively. The count of the participants knows about portable distance of radiography machine Figure 9 shows (52.00%) respondents answered $1.5\ m$ distance is enough between radiographer and machine, (42.00%) answered $20\ m$ while understanding of (6.00%) respondents were 15m .

This study evaluated the awareness level of doctors and radiographers working in radiography in which found (2.00%) of the stuff were in high level, (38.00%) awareness level was low and (60.00%) of the stuff were in medium level. In contrast to the current findings, a survey of 92 Turkish medical professionals, including doctors, nurses, and technicians, demonstrated that 42.4% and 21.7% of them, respectively, were not aware of the risks associated with radiation and thought that routine radiologic tests were moderately safe. However, it was discovered that 77.3% of the radiology, radiotherapy, and dental professionals at a teaching hospital in Nigeria6 were aware of the risks associated with radiation.

Conclusion

Awareness and knowledge about ionizing radiation hazards and protective measures among health care personal may differ in hospitals based on training level and profession. The present findings of this research revealed that, in general there was a medium level of awareness and knowledge about ionizing radiation hazards among doctors and radiographers. All participants were healthy and had no disease working in the field of entail radiation exposure due to the usage of protective equipment's and portable distance consideration. However, most of the radiographers demonstrated insufficient knowledge about ionizing radiation hazards. These findings emphasis the necessity to raise awareness and knowledge about ionizing radiation hazards of radiographers.

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