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Occupational risks among radiation workers at hospitals in AL-Muthanna governorate, Iraq: 2021-2022

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***Abstract*---**Cross-sectional study was conducted among participant in All radiation units in hospitals in AL-Muthana Governorate were taken into this study done by face-to-face interviews with 95 participants from radiological units to find out occupational risk for radiation workers and to identify the extent of the obligations of radiation workers in hospital in terms of wearing personal protective equipment**.** Total respondent was 95, Their mean age was 37 years, 70.5% of the were males, one third of them were radiographers work in the x-ray units, most of them were married, 41.1% hold a diploma certificate. The study found that 89% of staff answer known about availability of PPI (lead coat) while only 45.4% use of them when dialing with radiation on the other hand 50.9-92% of staff answer about unavailability of other PPI such as theroid shield, genital shield, and lead glasses). only 63.2% of the staff have training course about occupational health and safety. With all questions statical significant at P. value <0.05. Health care professional in radiological units of al-muthnia hospital face high risk from exposure to radiations thought unavailable personal protective equipment PPI such (thyroid shield, genital shield, lead glass) in all radiological units and low awareness of staff of use of these PPI

***Keywords*---**healthcare workers, ionizing radiation, safety measures, hospitals AL-Muthana Governorate.

Introduction

The emission or transmission of energy in the form of waves or particles through a space or material medium is referred to as radiation [1] Ionizing radiation's use in medicine is on the rise all around the world Globally, approximately 3000 million diagnostic imaging and over 5 million radiation therapy treatments are estimated to be performed each year [2] Annually, roughly 70 million CT (Computed Tomography) tests are performed in the United States [3] Dental X-rays have been linked to an increased risk of cancer, according to prior research [4,5] Thyroid cancer risk was higher among female dentists and dental hygienists, according to a study on dental practitioners and thyroid cancer [6] Radiation badges that exceeded approved protective limits were most typically worn by cardiology personnel [7] Magnetic resonance imaging (MRI) is a noninvasive imaging technology with superior soft tissue contrasts and physiological and functional applications. Since the 1980s, MRI has been a mainstay of non-invasive diagnostic imaging as it does not expose the body to radiation. To obtain comprehensive images, MRI uses a high magnetic field, quickly changing magnetic fields, radio waves, and a computer. However, there are some hazards associated with MRI. As the use of MRI in clinical practice has increased, healthcare workers must be taught in MRI safety in order to safeguard patients from the hazards of MRI [8] Ionizing radiation overexposure and unregulated exposure are key factors in the development of malignancies and genetic abnormalities [9,10, 11] It also has a negative impact on the hematopoietic system, digestive system, skin, testicles, ovaries, and central nervous system, neurological system, and the lens of the eye [11] According to the International Commission on Radiological Protection (ICRP), the annual occupational dose limit for ionizing radiation should not exceed 20 mSv (Units are Sv (Sievert) and μSv and usually determined per year of exposure. As a result, the use of personal dosimeters (Film Badge) to measure the quantity of radiation received by healthcare workers is required [9] Depending on the energy of the radiated particles, radiation is classified as ionizing or non-ionizing [12] Electromagnetic radiation (gamma or X-rays) and particulate radiation (neutrons, beta, or alpha particles) are the two sources of energy that make up ionizing radiations [13]

Study objective

Evaluation occupational risk for radiation workers and to identify the extent of the obligations of radiation workers in hospital in terms of wearing personal protective equipment.

Material and method

Design of the Study

This study employed a cross- sectional study to assess occupational risks and safety procedures for workers in radiation units in hospitals

The Sample of the Study

All radiation units (X-ray- CT-Scan- MRI - Dental x- ray - sonar - cardiac catheterization- lithotripsy) and health workers (Physician radiologist – cardiologist-urology specialist doctor - diagnostic radiology technologist Radiographer - Medical assistant - Dentist - physical -Nurse) in hospitals in AL-Muthana Governorate were taken into this study.

Data Collection

The questionnaire was developed and built by the researcher and supervisor and updated by experts. The draft questionnaire was presented to five experts to study and analyse its contents and the importance of clarity and suitability to achieve the objectives of the current study. All comments of experts have been taken into account for revision and revision .Data were collected during the period from 1st November, 2021 to 1st May, 2022. All governorate hospitals and the Specialized Dental Centre were visited several times. The first visits were to inform the official of the time of visiting the places to collect a sample of the medical staff, and the other visits were a random selection of cadres and an explanation of how to fill out the form The forms were distributed to all medical staff present in the selected unit at the time of the survey The medical staff selected by the researcher were informed that their participation was voluntary In addition, they were also told not to write their names on the form and that their response would be kept confidential .*Socio demographic characteristic such as (age, gender, marital status, and education level, Occupational tittle,). (Employee's knowledge about occupational risk in radiological units.

Results

Table (1) shows sociodemographic characteristics of the study sample. Their mean age was 37 years, 70.5% of the were males, one third of them were radiographers work in the x-ray units, most of them were married, 41.1% hold a diploma certificate,

Table (1): Socio-demographic characteristics of the study population

			Mean±SD	Median (Min.- Max.)
Age			37.99±10.21	35.00 (20 – 65)
			Frequency	Percent
Gender		Male	67	70.5
		Female	28	29.5
Unit	X-Ray		34	35.8
	CT -Scan		24	25.3
	Cardiac Catheterization		12	12.6
	Sonar		7	7.4
	Dental X Ray		7	7.4
	MRI		6	6.3
	Lithotripsy		5	5.3
Marital Status		Single	15	15.8

	Married	80	84.2
Occupational Title	Radiographer	32	33.7
	Physician Radiologist	17	17.9
	Physical	13	13.7
	Nurse	11	11.6
	Medical Assistant	7	7.4
	Urology Specialist Doctor	4	4.2
	Diagnostic Radiology Technologist	4	4.2
	Dentist	4	4.2
	Cardiologist	3	3.2
Education	PhD	24	25.3
	MSc	1	1.1
	BSc	20	21.1
	Diploma	39	41.1
	Secondary Education	11	11.6

The answers of the study sample to the study questions are shown in Table (2). Some of the protective measures were excellently available, like the radiological exposure work areas appropriately designed; the units of the radiation department were isolated from the rest of the hospitals units; appropriate radiation warning signs posted at entrance; availability of lead coats; provision with a dosimeter thermo-luminescent dosimeter; pre-employment examination of all workers; periodic medical examination of all workers; documents preserve related to the uses of radioactive materials, radiological devices and protection from their dangers ; taking courses in the field of occupational safety and risks; knowledge about the danger of ionizing radiation like DNA damage, skin burns and cancer; availability of periodic surveillance radiation safety standard level in radiological; the radiation room is usually closed during exposure to radiation; silver and accessories and necklaces are removed when entering the radiation area; the thermos luminescence dosimeter be withdrawn and replaced every six months; the basic principles of radiation protection applied which depend on taking into account the three factors of time, distance and shielding; vacuums are usually available in the environment of radiological diagnostic room; the presence of adequate lighting in the workplace radiation; and the availability of lead barriers in radiology room to prevent radiation leakage;

Table (2): Answers of the study population to study questions

N	Question	Yes No. (%)	No No. (%)	I do not know No. (%)
1	Are the radiological exposure work areas appropriately designed?	89 (93.7)	2 (2.1)	4 (4.2)
2	Are the units of the radiation department isolated from the rest of the hospital unit?	72 (75.8)	23 (24.2)	0 (0.0)
3	Are appropriate radiation warning signs posted at entrance?	68 (71.6)	25 (26.3)	2 (2.1)
4	Are the following personal protective equipment available at your workplace?			

	Lead Coat:	85 (89.5)	10 (10.5)	0 (0.0)
	Thyroid shield is present:	27 (28.4)	68 (71.6)	0 (0.0)
	Genital shield is present:	3 (3.2)	92 (96.8)	0 (0.0)
	Protective glasses:	35 (36.8)	60 (63.2)	0 (0.0)
5	Do you wear the following personal protective equipment appropriately?			
	Lead coat:	45 (47.4)	50 (52.6)	0 (0.0)
	Lead gloves:	5 (5.3)	90 (94.7)	0 (0.0)
	Thyroid shield:	18 (18.9)	77 (81.1)	0 (0.0)
	Genital shield:	3 (3.2)	92 (96.8)	0 (0.0)
	Protective glasses:	19 (20.0)	76 (80.0)	0 (0.0)
6	Do you use personal equipment when dealing with radioactive materials?			
	Lead coat:	10 (10.5)	22 (23.2)	63 (66.3)
	Lead gloves:	7 (7.4)	25 (26.3)	63 (66.3)
	Thyroid shield:	1 (1.1)	31 (32.6)	63 (66.3)
	Genital shield:	1 (1.1)	31 (32.6)	63 (66.3)
	Protective glasses:	3 (3.2)	29 (30.5)	63 (66.3)
7	Have the staff been provided with a dosimeter TLD (Thermo Luminescent Dosimeter)?	94 (98.9)	1 (1.1)	0 (0.0)
8	Have you had any pre-employment examination of all workers (Blood CBC–Skin hypersensitivity –Eye –Semen S.F.A)	87 (91.6)	8 (8.4)	0 (0.0)
9	Do you have a periodic medical examination of all workers (Blood -Semen)	83 (87.4)	12 (12.6)	0 (0.0)
10	Are there documents preserve related to the uses of radioactive materials and radiological devices and protection from their dangers) workplace?	31 (32.6)	60 (63.2)	4 (4.2)
11	Have you taken courses in the field of occupational safety and risks?	60 (63.2)	34 (35.8)	1 (1.1)
12	Do you know the danger of ionizing radiation (damage DNA)?			
	Skin Burns:	83 (87.4)	12 (12.6)	0 (0.0)
	Cancer:	86 (90.5)	9 (9.5)	0 (0.0)
	Cardiovascular Disease:	44 (46.3)	51 (53.7)	0 (0.0)
13	Do working mothers of childbearing age receive special training in safety procedures and occupational hazards from radiation?	2 (2.1)	35 (36.8)	58 (61.1)
14	Is there periodic surveillance radiation safety standard level in radiological?	92 (96.8)	2 (2.1)	1 (1.1)
15	Do you suffer from?			
	Nausea:	28 (29.5)	67 (70.5)	0 (0.0)
	Vomiting:	7 (7.4)	88 (92.6)	0 (0.0)
	Headache:	21 (22.1)	74 (77.9)	0 (0.0)
	Skin Burns:	0 (0.0)	95 (100.0)	0 (0.0)
	Pigmentation:	0 (0.0)	95 (100.0)	0 (0.0)
	Vitiligo:	0 (0.0)	95 (100.0)	0 (0.0)
	Cataract:	1 (1.1)	94 (98.9)	0 (0.0)

	Infertility: Cancer:	0 (0.0) 1 (1.1)	95 (100.0) 94 (98.9)	0 (0.0) 0 (0.0)
16	Are you sure that the radiation room is closed during exposure to radiation?	95 (100.0)	0 (0.0)	0 (0.0)
17	Are silver and accessories and necklaces removed when entering the radiation area?	91 (95.8)	4 (4.2)	0 (0.0)
18	Do you work at non-governmental photographing clinic?	62 (65.3)	33 (34.7)	0 (0.0)
26	Do you wash your hands in the universal way of washing hands after stepping out of the radiation zone? For 10-20 seconds: For 20-30 seconds: For 30-40 seconds: For 40-60 seconds:	 70 (73.7) 16 (16.8) 6 (6.3) 3 (3.2)	 25 (26.3) 79 (83.2) 89 (93.7) 92 (96.8)	 0 (0.0) 0 (0.0) 0 (0.0) 0 (0.0)

Table (3) clarifies that male staff answers significantly statistically higher than female staff for the following results:

- Knowledge about personal protective equipment included: "Thyroid shield is present?" at p.value of :0.048,"there is a lead coat? " at p.value of: 0.018, "have you had any pre-employment examination of all workers (blood CBC – skin hypersensitivity–eye –semen fluid analysis)? "at p.value of: 0.046.
- Training course induced: Have you taken courses in the field of occupational safety and risks? at a p value of: 0.031,
- Knowledge about effect of radiation on radiology worker that included:" Do you suffer nausea" at p.value of: 0.036, "Do you have known about the danger of ionizing radiation that causing cancer disease" at p.value of: 0.018.
- Working in privet clinic "Do you work at non-governmental photographing clinic?" at p.value of:0. 003.On the other hand, female staff answers significantly statistically higher than male staff for the question "Do working mothers of childbearing age receive special training in safety procedures and occupational hazards from radiation?" at p.value of: 0.018.

Table (3): The respondent answers to the questions categorized by gender

N	Questions	Answer:	Gender		Total	Sig.
			Male	Female		
1	Thyroid shield is present?	Yes	23	4	27	0.048*
			34.3%	14.3%	28.4%	
		No	44	24	68	
			65.7%	85.7%	71.6%	
2	There is a lead coat?	Yes	37	8	45	0.018*
			55.2%	28.6%	47.4%	
		No	30	20	50	
			44.8%	71.4%	52.6%	
3	Have you had any pre-employment examination of all	Yes	64	23	87	0.046**
			95.5%	82.1%	91.6%	

	workers (blood CBC –skin hypersensitivity–eye –semen S.F.A)?	No	3	5	8	
			4.5%	17.9%	8.4%	
4	Do you have a periodic medical examination of all workers (blood -semen)?	Yes	62	21	83	0.037**
			92.5%	75.0%	87.4%	
		No	5	7	12	
			7.5%	25.0%	12.6%	
5	Have you taken courses in the field of occupational safety and risks?	Yes	47	13	60	0.031**
			70.1%	46.4%	63.2%	
		No	20	14	34	
			29.9%	50.0%	35.8%	
		Do Not Know	0	1	1	
			0.0%	3.6%	1.1%	
6	Do you have known about the danger of ionizing radiation that causing cancer disease?	Yes	64	22	86	0.018**
			95.5%	78.6%	90.5%	
		No	3	6	9	
			4.5%	21.4%	9.5%	
7	Do working mothers of childbearing age receive special training in safety procedures and occupational hazards from radiation?	Yes	1	1	2	0.0001**
			1.5%	3.6%	2.1%	
		No	9	26	35	
			13.4%	92.9%	36.8%	
		Do Not Know	57	1	58	
			85.1%	3.6%	61.1%	
8	Do you suffer nausea?	Yes	24	4	28	0.036*
			35.8%	14.3%	29.5%	
		No	43	24	67	
			64.2%	85.7%	70.5%	
9	Do you work at non-governmental photographing clinic?	Yes	50	12	62	0.003*
			74.6%	42.9%	65.3%	
		No	17	16	33	
			25.4%	57.1%	34.7%	

Table (4) shows that the following results:

- The Answers of staff from Elwaladah Teaching Hospital significantly statistically differed from the answers of staff of the other involved hospitals regarding the appropriate designation of radiological exposure areas.at p value of: 0.028. on the other hand, Warka General Hospital and Rumaitha General Hospital showed significant negative staff answers to the "isolation of the radiation department from the rest of the hospital units ". from other mentioned hospitals at a p.value of: 0.001.
- Regarding the "availability of appropriate radiation warning signs posted at entrance" There were significant statistical differences in the answers of staff in Elwaladah Teaching Hospital and Rumaitha General Hospital from the rest of other hospitals at p.value 0.0001. while for the availability of personal protective equipment at the workplace Elwaladah Teaching Hospital was significantly different from other hospitals at p .value 0.004 for lead coat, 0.0001for protective glasses,and Thyroid shields.
- Also, the hospitals differed significantly variably regarding wearing the

personal protective equipment appropriately and the use of personal equipment (lead coat, protective glasses, Thyroid shields, Genital shield, and Lead gloves) when dealing with radioactive materials at (p.value of: 0.001). Moreover, the answers were significantly variable regarding the answers to the questions of the availability of pre-employment examination and periodic medical examination of all workers. At p value of: 0.027.

- there were significant differences in answers relevant to the availability of documents preserve related to the uses of radioactive materials and radiological devices and protection from their danger's workplace; at p value of: 0.004, staff enrollment training in the field of occupational safety and risks at p value of: 0.007, the availability of vacuums in the environment of radiological diagnostic room. at p value of: 0.001, and work at non-governmental photographing clinic at p value of: 0.008

Table (4): Comparison of participant's answers according to the medical institution

N	Answer	medical institution							Sig.*
		Al-Hussein Teaching Hospital	Elwaladah Teaching Hospital	Warka General Hospital	Al-Khader General Hospital	Rumaitha General Hospital	Specialized Dental Center	Total	
1	Are the radiological exposure work areas appropriately designed?								
	Yes	41	16	2	9	15	6	89	0.028
		100.0%	72.7%	100.0%	100.0%	100.0%	100.0%	93.7%	
	No	0	2	0	0	0	0	2	
		0.0%	9.1%	0.0%	0.0%	0.0%	0.0%	2.1%	
	Do not know	0	4	0	0	0	0	4	
		0.0%	18.2%	0.0%	0.0%	0.0%	0.0%	4.2%	
2	Are the units of the radiation department isolated from the rest of the hospital units?								
	Yes	33	20	0	3	10	6	72	0.001
		80.5%	90.9%	0.0%	33.3%	66.7%	100.0%	75.8%	
	No	8	2	2	6	5	0	23	
		19.5%	9.1%	100.0%	66.7%	33.3%	0.0%	24.2%	
3	Are appropriate radiation warning signs posted at entrance?								
	Yes	39	3	0	6	14	6	68	0.0001
		95.1%	13.6%	0.0%	66.7%	93.3%	100.0%	71.6%	
	No	2	18	1	3	1	0	25	
		4.9%	81.8%	50.0%	33.3%	6.7%	0.0%	26.3%	
	Do not Know	0	1	1	0	0	0	2	
		0.0%	4.5%	50.0%	0.0%	0.0%	0.0%	2.1%	
4	Are the following personal protective equipment available at your workplace?								

	A-There is a lead coat?							
	Yes	40	14	2	9	14	6	85	0.004
		97.6%	63.6%	100.0%	100.0%	93.3%	100.0%	89.5%	
	No	1	8	0	0	1	0	10	
		2.4%	36.4%	0.0%	0.0%	6.7%	0.0%	10.5%	
	B-There are protective glasses								
	Yes	30	1	0	1	0	3	35	0.0001
		73.2%	4.5%	0.0%	11.1%	0.0%	50.0%	36.8%	
	No	11	21	2	8	15	3	60	
		26.8%	95.5%	100.0%	88.9%	100.0%	50.0%	63.2%	
	C-Thyroid shields is present								
	Yes	27	0	0	0	0	0	27	0.0001
		65.9%	0.0%	0.0%	0.0%	0.0%	0.0%	28.4%	
	No	14	22	2	9	15	6	68	
		34.1%	100.0%	100.0%	100.0%	100.0%	100.0%	71.6%	
5	Are you wearing the following personal protective equipment appropriately?								
	A-There is a lead coat								
	Yes	28	6	0	1	5	5	45	0.0001
		68.3%	27.3%	0.0%	11.1%	33.3%	83.3%	47.4%	
	No	13	16	2	8	10	1	50	
		31.7%	72.7%	100.0%	88.9%	66.7%	16.7%	52.6%	
	B-Thyroid shields is present								
	Yes	18	0	0	0	0	0	18	0.0001
		43.9%	0.0%	0.0%	0.0%	0.0%	0.0%	18.9%	
	No	23	22	2	9	15	6	77	
		56.1%	100.0%	100.0%	100.0%	100.0%	100.0%	81.1%	
	C-Genital shield is present								
	Yes	0	0	0	0	0	3	3	0.0001
		0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	3.2%	
	No	41	22	2	9	15	3	92	
		100.0%	100.0%	100.0%	100.0%	100.0%	50.0%	96.8%	
	D-There are protective glasses								
	Yes	19	0	0	0	0	0	19	0.0001
		46.3%	0.0%	0.0%	0.0%	0.0%	0.0%	20.0%	
	No	22	22	2	9	15	6	76	
		53.7%	100.0%	100.0%	100.0%	100.0%	100.0%	80.0%	
13	Do you use personal equipment when dealing with radioactive materials?								
	A-There is a lead coat								
	Yes	6	1	0	2	1	0	10	0.0001
		14.6%	4.5%	0.0%	22.2%	6.7%	0.0%	10.5%	
14	No	2	13	0	3	2	2	22	
		4.9%	59.1%	0.0%	33.3%	13.3%	33.3%	23.2%	
	Do Not Know	33	8	2	4	12	4	63	
		80.5%	36.4%	100.0%	44.4%	80.0%	66.7%	66.3%	
6	B-Lead gloves are available								
	Yes	5	1	0	1	0	0	7	0.001

		12.2%	4.5%	0.0%	11.1%	0.0%	0.0%	7.4%	
	No	3	13	0	4	3	2	25	
		7.3%	59.1%	0.0%	44.4%	20.0%	33.3%	26.3%	
	Do Not Know	33	8	2	4	12	4	63	
		80.5%	36.4%	100.0%	44.4%	80.0%	66.7%	66.3%	
	C-Thyroid shields is present								
	Yes	1	0	0	0	0	0	1	
		2.4%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	
	No	7	14	0	5	3	2	31	0.006
		17.1%	63.6%	0.0%	55.6%	20.0%	33.3%	32.6%	
	Do Not Know	33	8	2	4	12	4	63	
		80.5%	36.4%	100.0%	44.4%	80.0%	66.7%	66.3%	
	D-Genital shield is present								
	Yes	1	0	0	0	0	0	1	
		2.4%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	
	No	7	14	0	5	3	2	31	0.006
		17.1%	63.6%	0.0%	55.6%	20.0%	33.3%	32.6%	
	Do Not Know	33	8	2	4	12	4	63	
		80.5%	36.4%	100.0%	44.4%	80.0%	66.7%	66.3%	
	E-There are protective glasses								
	Yes	2	0	0	1	0	0	3	
		4.9%	0.0%	0.0%	11.1%	0.0%	0.0%	3.2%	
	No	6	14	0	4	3	2	29	0.004
		14.6%	63.6%	0.0%	44.4%	20.0%	33.3%	30.5%	
	Do Not Know	33	8	2	4	12	4	63	
		80.5%	36.4%	100.0%	44.4%	80.0%	66.7%	66.3%	
7	Have you had any pre-employment examination of all workers (blood CBC –skin hypersensitivity – eye –semen S.F.A)								
	Yes	40	16	2	8	15	6	87	
		97.6%	72.7%	100.0%	88.9%	100.0%	100.0%	91.6%	
	No	1	6	0	1	0	0	8	0.027
		2.4%	27.3%	0.0%	11.1%	0.0%	0.0%	8.4%	
8	Do you have a periodic medical examination of all workers (blood -semen)								
	Yes	40	16	0	7	14	6	83	0.001
		97.6%	72.7%	0.0%	77.8%	93.3%	100.0%	87.4%	
	No	1	6	2	2	1	0	12	
		2.4%	27.3%	100.0%	22.2%	6.7%	0.0%	12.6%	

9	Are there documents preserve related to the uses of radioactive materials and radiological devices and protection from their danger's workplace							
	Yes	16	3	2	4	2	4	31	0.004
		39.0%	13.6%	100.0%	44.4%	13.3%	66.7%	32.6%	
	No	25	16	0	4	13	2	60	
		61.0%	72.7%	0.0%	44.4%	86.7%	33.3%	63.2%	
	Do Not Know	0	3	0	1	0	0	4	
		0.0%	13.6%	0.0%	11.1%	0.0%	0.0%	4.2%	
10	Have you taken courses in the field of occupational safety and risks?							
	Yes	31	7	0	6	11	5	60	0.007
		75.6%	31.8%	0.0%	66.7%	73.3%	83.3%	63.2%	
	No	9	15	2	3	4	1	34	
		22.0%	68.2%	100.0%	33.3%	26.7%	16.7%	35.8%	
	Do Not Know	1	0	0	0	0	0	1	
		2.4%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	
11	Do you work at non-governmental photographing clinic?							
	Yes	31	10	0	4	11	6	62	0.008
		75.6%	45.5%	0.0%	44.4%	73.3%	100.0%	65.3%	
	No	10	12	2	5	4	0	33	
		24.4%	54.5%	100.0%	55.6%	26.7%	0.0%	34.7%	
12	Are vacuums available in the environment of radiological diagnostic room?							
	Yes	39	12	2	5	12	6	76	0.001
		95.1%	54.5%	100.0%	55.6%	80.0%	100.0%	80.0%	
	No	2	10	0	4	3	0	19	
		4.9%	45.5%	0.0%	44.4%	20.0%	0.0%	20.0%	
13	Are lead barriers available in radiology room to prevent radiation leakage?							
	Yes	41	17	2	8	15	6	89	0.031
		100.0%	77.3%	100.0%	88.9%	100.0%	100.0%	93.7%	
	No	0	1	0	1	0	0	2	
		0.0%	4.5%	0.0%	11.1%	0.0%	0.0%	2.1%	
	Do Not Know	0	4	0	0	0	0	4	
		0.0%	18.2%	0.0%	0.0%	0.0%	0.0%	4.2%	
		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

Discussion

The present study was performed to investigate the occupational health and safety as well as clinical recommendations of HCWs regarding radiation hazard. It is critical to be aware of the effects of ionizing radiation exposure, as well as the pathological consequences, such as the development of cancer as a result of such

exposure.[14] Regarding the sociodemographic our results are similar to founding of several studies [15][16][17]. According to the International Commission on Radiological Protection (ICRP), the annual occupational dose limit for ionizing radiation should not exceed 20 mSv. As a result, personal dosimeters are required to measure the amount of radiation received by HCWs.[18]

Most of participants have good knowledge about the danger of radiation on skin and cause cancer that similar to an anther study motioned that The HCWs are the most relevant people dealing with daily exposure to radiology procedures. Thus, following safety rules and protection against radiation are crucial in HCWs. Regarding the knowledge, the study results showed that generally, the participants had average knowledge about radiation protection. The level of knowledge was 95%. Among the HCWs, [19] on the other hand, there is limit available of radiation protection such as thyroid shield, genital shield, lead glass in all hospitable that make staff to be at more risk from exposure radiations this in consist with Elamin [19] found that despite the fact that all government and private hospitals are provided with lead aprons, the radiographers did not always use them. Furthermore, Eze et al. [20] and Bhatt et al. [21] reported insufficient availability of lead aprons. In contrast to our study, a study conducted by Noohi [22] The radioactive sources utilized in nuclear medicine and the interventional procedures performed more frequently in cardiology and radiology departments result in increased radiation exposure for the staff Therefore, the result most participant in this study doesn't use personal protective equipment that consist with study that reviled that the use of PPDs was low in this study, it is far better than the finding in a study conducted in different hospitals in Nepal, in which around 65% of the radiation workers studied had never been monitored for radiation exposure, and there was no quality, control program in any of the surveyed hospitals The reverse is true of the findings in a study by Mojiri et al., that reported high awareness of necessity of application of film badges(70%) and periodic examination (63%) among the participants; aswell as application of protective devices for themselves (83.1%) and their patients (78.9%) [23] and opposite to results that mentioned healthcare professionals who work in these departments use protective apparatuses such as lead shielding, lead glass and thyroid protection. However, 10.4% of the participants in the present study reported mostly forgetting to use a dosimeter [24]

Concerning the effect of training course to increase awareness of occupational health and safety Studies have revealed that healthcare professionals who continuously work in a radiation environment have a higher level of knowledge of radiation safety compared to others, although insufficient training is observed even in these groups, highlighting the fact that such training should be provided not only through working life but also during specialty training [25]

Conclusions and Recommendations

Health care professional in radiological units of al-muthnia hospital face high risk from exposure to radiations thought unavailable personal protective equipment PPI such (thyroid shield, genital shield, lead glass) in all radiological units and low awareness of staff of use of these PPI therefore the recommended that increase training course for occupational health and safety in medical radiology

department of mentioned hospitals and necessary to available periodic examination about present and use of PPI in radiology department

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