Health Educational Program for Radiographers Regarding Effect of Dark Room

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Abstract

Background: Radiographers are exposed to certain chemicals which lead to some adverse health effects. Nevertheless, radiographers report many unexplained work-related symptoms attributed to dark room disease symptoms**. The aim of the study** was to evaluate the effect of educational program for radiographers regarding effects of the dark room. **Research design**: A quasi experimental design was used. **Setting:** The study was conducted at the X-ray department affiliated with Benha University Hospital. **Sample:** Convenience sample of 70 radiographers was used. **Tools:** Three tools were used; **Tool I:** A structured interview questionnaire pre & post health educational program that consists of two parts; **Part I:** Socio demographic & work characteristic data of radiographers. **Part II:** Concerned with radiographer's knowledge about the dark room effects. **Part III:** Concerned with radiographers' health problems regarding effects of darkroom omitting through the last six months. **Tool II:** Observational checklist to assess radiographers' practice about safety measures. **Tool III:** Assess the environment of the radiology department. **Results:** 64.3% of the studied radiographers suffered from health problems such as headache, fatigue, respiratory problems and skin ulcers pre implementation of educational health program, which decreased to 51.4% in post implementation, 14.3% of the studied radiographers had total good knowledge level pre implementation of the program compared to 81.4 % post implementation, 32.9% of the studied radiographers had satisfactory practice **Conclusion:** The health educational program succeeded to improve the radiographers' level of knowledge and practice regarding the dark room effects and decrease the health problems. **Recommendation:** Continuous health educational program and classes for radiographers to improve their knowledge and enhance their practice level regarding caring them from dark room effects.

Keywords: Dark room effects, health education program, radiographers.

Introduction

The radiographer is a person who operates a machine that uses radiation, especially X-rays, to take pictures of the inside of people or things or for the treatment of disease. Radiographers, also known as radiologic technologists, diagnostic radiographers and medical radiation technologists are healthcare professionals who specialize in the imaging of human anatomy for the diagnosis and treatment of pathology. Radiology is a branch of medicine that uses imaging technology to diagnose and treat disease. Radiology may be divided into two different areas, diagnostic radiology and interventional radiology. Doctors who specialize in radiology are called radiologists **(Kobos et al., 2022).**

Radiographers' roles are to provide patients, service users and families with information and support, including benefit and risk conversations to facilitate fully informed consent or withdrawal of consent. Work with patient's service users and families to facilitate and acquire imaging

and/or provide and immediate preliminary or definitive clinical report for images, manage the local environment and or wider services, and provide quality control and quality assurance. Lead, teach, train supervise and mentor others, enable audits, service evaluation, service improvements and innovations, undertake clinical trials and/or primary research projects. Undertake a public health system role for radiation protection and safety, as defined by their responsibilities as a duty holder under ionizing radiation medical exposure (**Jalalvandi et al., 2015).**

Dark room diseases caused of one of the world crises in the medical field. It is the end result of long hours of strenuous and full-fledged labor of some of the highest excellence of mental work in the modern world, the labor of radiologists, diagnostic radiographers, radiation therapists, clinical physicists, and dark room technicians (**Leesi et al., 2024).**

Dark room disease is a collection of symptoms that some healthcare workers, particularly radiographers, experience due to exposure to film-processing chemicals. It's not a specific medical condition with a clear diagnosis, but rather a term used to describe a range of symptoms associated with chemical exposure such as sore throat, coughing, wheezing, difficulty breathing, ocular red, itchy, or watery eyes, skin rashes, dermatitis, neurological headaches, fatigue, dizziness, other nausea, metallic taste in mouth phenidone a photographic developer, hydroquinone another photographic developer, thiosulfate as a photographic fixer, formaldehyde a preservative (**Freihat et al., 2024).**

Preventive Measures and best practices to minimize the risk of developing dark room disease, it's crucial to implement effective preventive measures and follow best practices in darkroom environments recommendation for radiology technicians adequate ventilation in clade ensure proper ventilation in the darkroom to dilute and remove chemical fumes, exhaust fans: install exhaust fans to draw out fumes directly from the source, regular maintenance: regularly clean and maintain ventilation systems to ensure optimal performance, personal protective equipment, such as gloves to protect the skin from direct contact with chemicals, masks or respirators to filter out airborne particles, fumes and eye protection to protect the eyes from splashes , fumes and protective clothing to minimize skin exposure **(Okeji et al., 2015).**

Community Health Nurses (CHNs) play an indispensable role in prevention, education, and management of these conditions, especially considering the widespread nature of radiographic practices. CHNs are often the bridge between medical practices and the community. They can conduct workshops and seminars for radiographers, educating them about the potential hazards in the darkroom, symptoms of darkroom diseases, and preventive measures (**Freihat et al., 2024).**

Significance of the study:

According to research done at radiology department of Benha University Hospital, a total of 70 radiographers have experienced different symptoms of the dark room disease, 61.4% of the radiographers experienced headache while 24.3% of the radiographers suffered from unexplained fatigue. On the other hand, 95.7% of the radiographers never complained of skin rash. According to the Research Department of Benha University in radiology aspects, the most predominant health complaint addressed by radiographers were headache 98.7%, discomfort breathing

78.9%, eye symptoms 65.8 % and sneezing 63.2% during working hours mentioned in darkroom deficiency of quality control measures for darkroom processing **(Research Department of Benha University, 2022)**

Aim of the study:

This study aimed to evaluate the effect of the educational program for radiographers regarding effect of darkroom.

Research hypotheses:

Knowledge and practices of the radiographers regarding effect of dark room will be improved after the implementation of the educational program.

Research design:

A quasi experimental research design was used in this study.

Research setting:

This study was carried out at the X-ray department affiliated with Benha University Hospital. The radiology department is one of several departments located inside Benha University Hospital. The radiology department inside the Hospital is divided into two parts. One part is located inside the Outpatient Clinics and serves many patients who visit daily Outpatient Clinics. The other department is located inside the internal medicine building and save the patients who are hesitant and detained within the Internal Medicine and Surgery Units in the Hospital.

Subjects:

Convenience sample of all radiographers at x-ray department in Benha University Hospital. Radiographers who were working in a darkroom inside the medicine Department included (70) radiographers.

Tools for Data Collection:

Data was collected through the following tools:

Tool I: A structured interviewing questionnaire, it was designed by researchers based on reviewing related literature and expert opinion and it was written in the simple Arabic language, which covered the following parts.

Part (1): A. Socio – demographic characteristics of the studied radiographers, which included 5 questions (age, sex, educational, qualifications, marital status, and residence).

B. Work characteristics which included 4 questions (working hours, experience years, monthly income, and training course).

Part (2): Concerned with radiographers' knowledge about dark room effects which included 7 closed ended questions multiple choice type (dark room, dark room specification, the rays increase in dark room, dark room safety and rules, disease resulting from being in darkrooms, complication of being in dark rooms, ways to prevent the harms of being in darkroom, getting rid of the effects of x-rays).

Scoring system:

The scoring system for radiographers' knowledge was calculated as follows 2 points for a correct and complete answer, 1 point for a correct and incomplete answer, and 0 for don't know. For each area of knowledge, the score of the items was summed-up and the total divided by the number of the items, and converted into a present score.

Total scores of knowledge=14

- Good when total score of knowledge was > 75% > 10Point
- Average when the total score was %50-%75= 7:10 Point
- Poor when the total score was <50% < 7

NB: Source of information question with not included in scoring system of knowledge.

Part (3): It was used to assess problems that appeared through last six month it included 10 symptoms such as (headache, nausea, skin ulcer, skin ash, sore throat, runny eyes, sweat night, tinnitus and unexplained fatigue).

Scoring system:

The scoring system for radiographers' health problems was calculated as follows 1 point for suffering from health problems and 0 for not suffering from health problems, the score of the items was summed-up and the total divided by the number of the items, and converted into a present score. The radiographer suffered from a health problem if the score was >80% > 16, while they didn't suffer if the score was<80% <16.

Tool II: Concerned with radiographers' practices which following:

Part I: Concerned with reported practices which included 4 items (physical activities, nutrition, personal protection and dealing with risks).

Part II: Concerned with observation checklist of the radiographers' practices regarding to materials safety data that provides critical information about hazards associated with material that used in radiology filed, this included chemical radioactive sources and other potentially risk items and adapted from **(Sinclair, 1988)** (product identification, hazards, identification, composition, information on ingredients, first aid measures. safe handling and storage- exposure controls physical and chemical properties- stability and reactivity, toxicological information, ecological information, disposal considerations transport information, regulatory information's must be ensuring staff are trained on their proper use in radiology departments can significantly reduce the risks of accidents, injuries and illness associated with handling hazardous materials.

Scoring system:

The scoring system for radiographers' practice was calculated as follow 1 for done and 0 for not done. The score of the items was summed-up and the total divided by the number of items and converted into a present score.

If the score of total practices> 80% > 56 was considered satisfactory practice and score of total practices <80% <56 was considered unsatisfactory.

Tool III: Environmental safety radiology department adopted from **(Abuzaid, 2019)** to asses OSHA permissible exposure limits which included 9 items (room, light, ventilation, door, wall, protection radiographers from radiation, implementing public protection system adherence to the standards of the international committee on radiation projections protection, personal protection applications).

Content Validity:

The tools were reviewed by five of Faculty's Staff Nursing reliable from Community Health Nursing Department Benha University and gave their opinion for clarity, relevance, comprehensiveness; applicability and easiness for implementation and according to their opinion minor modification were carried out.

Reliability:

Reliability of the tools was done in cronbach's alpha, a coefficient test which revealed that each of the tools contested of relatively homogeneous items as indicative by the moderate to high reliability of each tool, the internal consistency of knowledge was 0.712 number of question 4/0 and the internal consistency of practice was 0.826.

Ethical and legal consideration:

The study was approved by Ethical Research Committee at Faculty of Nursing - Benha University. All the ethical considerations for radiographers in radiology unit were secured. The participants were informed about the purpose and benefits of the study. Their participation was voluntary and they have the right to withdrawal in the

study without given any reason. In addition confidentiality and anonymity of the subjects were assured through coding of all data

Pilot study:

A pilot study was done on 10% of the total study sample (7 radiographers) to test clarity and applicability of the study tools and to estimate the time needed to fill each tool. No radical modifications were done according to the results of pilot study. Participants involved in the pilot study were included in the total study sample.

Field work:

The field work for this study includes four phases; assessment, planning, implementation, and evaluation phase. This was necessary for the researchers to be acquainted with and oriented about aspects of the research problem as well as to assist in the development of data collection tools. Also prepared instruction guideline handout for studied radiographers that included all items about radiotherapy, this took time for preparing the tools about two months.

It was prepared in Arabic language and illustration figures. The researcher implemented the instruction guideline through 4 phases as the following:

(I) Assessment phase: In this phase the health educational program assessed knowledge and practices of the studied radiographers about darkroom effects. Health educational booklet about radiotherapy was designed by the researcher after reviewing the related literature. It included answer to all mentioned questions in the 4 tools.

(II) Planning phase: The researchers identified the impotent needs for target group, set priorities of needs, goals and objectives were developed.

General objectives:

At the end of health educational program implementation, radiographers will be able to improve their knowledge and practice regarding effects of dark room.

Specific objectives:

At the end of health educational program implementation, radiographers should be able to:

1. Define the term of radiographer and list different types of radiology.
2. Identify Responsibilities of radiographers.
3. Explain skills and qualities of good radiographers.
4. Define of dark rooms and their specifications.
5. List dark room symptoms and side effects.
6. Apply wearing PPE.
7. Explain safety measure.
8. Apply safety consideration.

(III) Implementation phase: The data was collected from radiographers who attended in the previously selected hospital through the interview with them. The study was conducted at a period of six months which started from the beginning of September (2023) till the end of February (2024), the researchers attended two days/week for radiology department from 9 am to 2 pm, those days were Mondays and Wednesdays to collect data with distributed Health educational program for radiographers' practices receiving radiotherapy, these days are chosen according to the radiology department schedule and these days are appropriate for the researchers, the interviewed radiographers were divided into two groups depending on their responses to the interviewer, six sessions (theoretical and 4 practical) were applied and each session took 40 minutes and included break in between. In the first session, the researchers provided a trusty, warm and secure atmosphere between radiographers' group to increase the motivation to participate in all sessions of the health education program. The

second session covered the meaning of darkroom, dark room specification, different types of radiation, and safety rules of darkroom. The third session covered the meaning of darkroom effects, hazards of darkroom, darkroom complications and ways to prevent darkroom effects. The fourth session covered educating radiographers about safety measures of darkroom. The fifth session covered application of general guidelines for radiographers as wearing PPE, following safety measures and keeping up with new trends. The sixth session was the evaluation phase.

Phase IV (evaluation phase):

The impact of the guidance program was evaluated. Immediate evaluation included, immediate post program was implemented for all the subjects using the same tools which were used before the program.

Statistical analysis:

The collected data were organized, categorized, analyzed, and presented in the form of tables and figures using the Statistical Package for Social Sciences, version 22 (SPSS), which was used frequencies and percentages for qualitative descriptive data, chi-square coefficient X^2 was used for relation tests, mean and standard deviation was used for quantitative data.

Results:

Table (1): Shows that; 27.1% of the studied radiographers aged from 25 to less than 30 with mean and standard deviation was 33.82±7.11. 74.3% of studied radiographers were male, 34.3% had intermediate university diploma and 65.7% were married. Regarding residence; 54.3% of studied radiographers lived in rural regions.

Table (2): Shows that; 67.1% of the studied radiographers worked for 24 hours, 31.4% had from 6 to 10 years of experience with mean and standard deviation was 8.71±5.44, 71.4% did not have enough income. Regarding training; 62.9% of studied radiographers had training course in first aid.

Table (3): Clears that; 100% of the studied radiographers reported 'yes' regarding occupational health and safety tools provided to radiographers at work place and presence of occupational safety and health standards.

Figure (1): Indicates that; 14.3% of the studied radiographers had good total knowledge level pre implementation of educational program, but this percentage increased to 81.4% in post implementation of educational program, while 47.1% of them had poor total knowledge level pre implementation of educational program which decreased to 5.7% in post implementation of educational program

Figure (2): Illustrates that; 64.3% of the studied radiographers suffering from health problem pre implementation of educational program which decreased to 51.4% in post implementation of educational program, while 35.7% of them not suffering from health problem pre implementation of educational program which increased to 48.6% in post implementation of educational program after implementation of educational program.

Figure (3): Illustrates that; 32.9% of the studied radiographers had satisfactory total practices' level regarding prevention of darkroom disease pre implementation of educational program which increased to 85.7% in post implementation of educational program, while 67.1% had unsatisfactory total practices level pre implementation of educational program which decreased to 14.3% in post implementation of educational program.

Table (4): Clears that; there was statistically significant correlation between the studied radiographers' total knowledge and their practices regarding prevention of darkroom disease pre and post implementation of educational program.

Table (1): Distribution of studied radiographers regarding their socio-demographic characteristics (n=70).

Socio-demographic characteristics	No.	%
Age		
< 25 years	7	10.0
25-30 years	19	27.1
30-35 years	17	24.3
35- 40 years	11	15.7
40- 45 years	11	15.7
45 years and over	5	7.1
Mean ±SD	**33.82±7.11**	
Sex		
Male	52	74.3
Female	18	25.7
Educational level		
Health technical institute	21	30.0
Intermediate university diploma	24	34.3
Bachelor's degree/higher education diploma	22	31.4
Postgraduate studies	3	4.3
Marital status		
Single	13	18.6
Married	46	65.7
Widowed	5	7.1
Divorced	6	8.6
Residence		
Urban	32	45.7
Rural	38	54.3

Table (2): Distribution of studied radiographers regarding the work characteristics (n=70).

Work characteristics	No.	%
Work Hours		
6 hours	7	10.0
8 hours	16	22.9
24 hours	47	67.1
Experience		
1-5 years	18	25.7
6-10 years	22	31.4
11-15 years	16	22.9
15 years and over	14	20.0
Mean ±SD	**8.71±5.44**	
Income		
Not enough	50	71.4
Enough	17	24.2
Enough and saves	3	4.2
Training courses		
Health and safety	35	50.0
Protective measure	15	21.4
First aids	44	62.9
Infection control	27	38.6
Quality management	33	47.1
No	7	10.0

Table (3): Distribution of studied workplace regarding health and safety tools provided to radiographers at work place and presence of standards (n=70)

Items	Work place facilities			
	Yes		No	
	No.	%	No.	%
Occupational safety and health tools				
There are guidelines that explain safety and health data for handling chemicals	1	100	0	0.0
There is a fire extinguisher	1	100	0	0.0
There is a safety instructions guide	1	100	0	0.0
There is a regular check-up on an ongoing basis	1	100	0	0.0
There are objects that impede movement inside the room	1	100	0	0.0
There are stands on which chemicals are placed	1	100	0	0.0
There are training courses to learn what is new	1	100	0	0.0
There are regular lectures to raise awareness about dealing with chemicals	1	100	0	0.0
Occupational safety and health standards				
Having an address on chemicals	1	100	0	0.0
Know the entry and exit lanes	1	100	0	0.0
Mechanism for dealing with spilled materials	0	0.0	1	100
First aid and emergency procedures	1	100	0	0.0

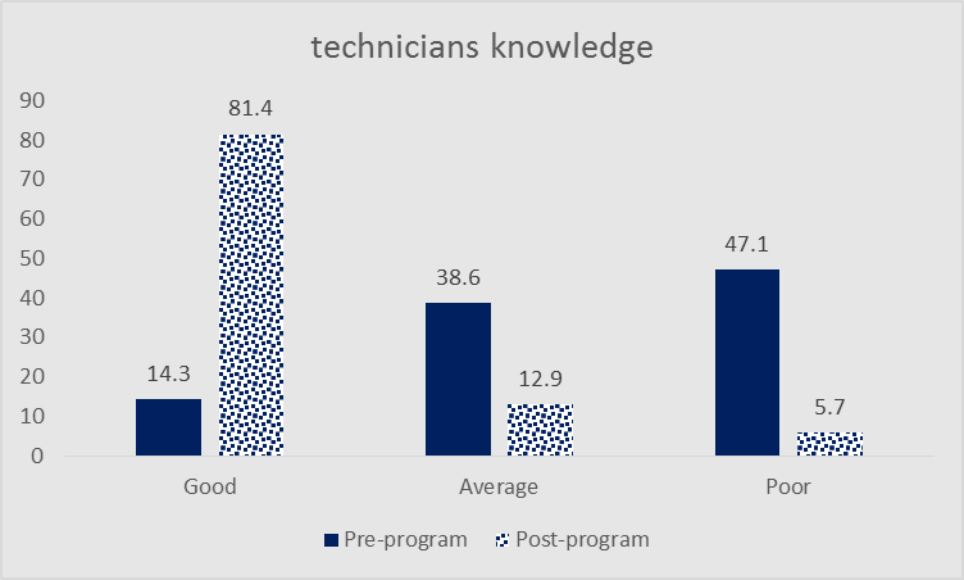

Figure (1): Distribution of the studied radiographers regarding their total knowledge level pre and post program implementation (n=70).

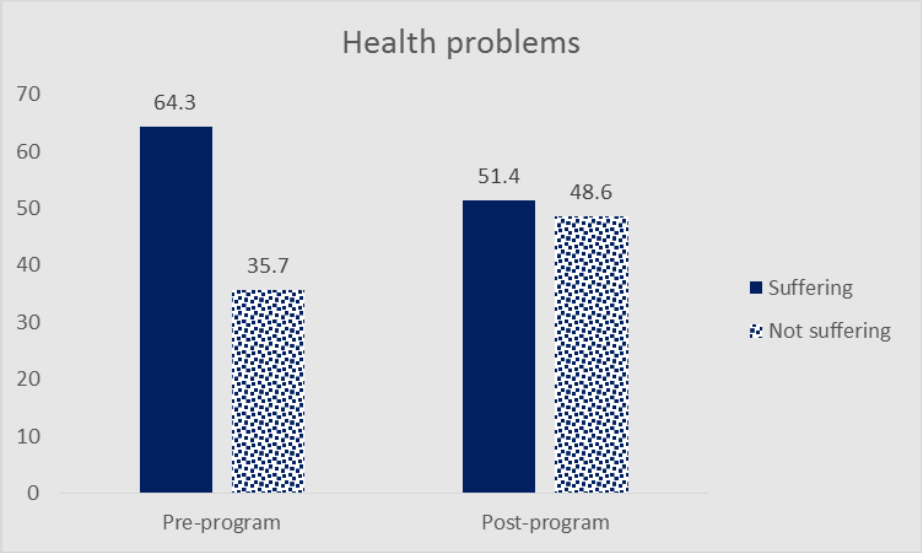

Figure (2): Distribution of studied radiographers regarding their suffering of health problems pre and post program implementation (n=70)

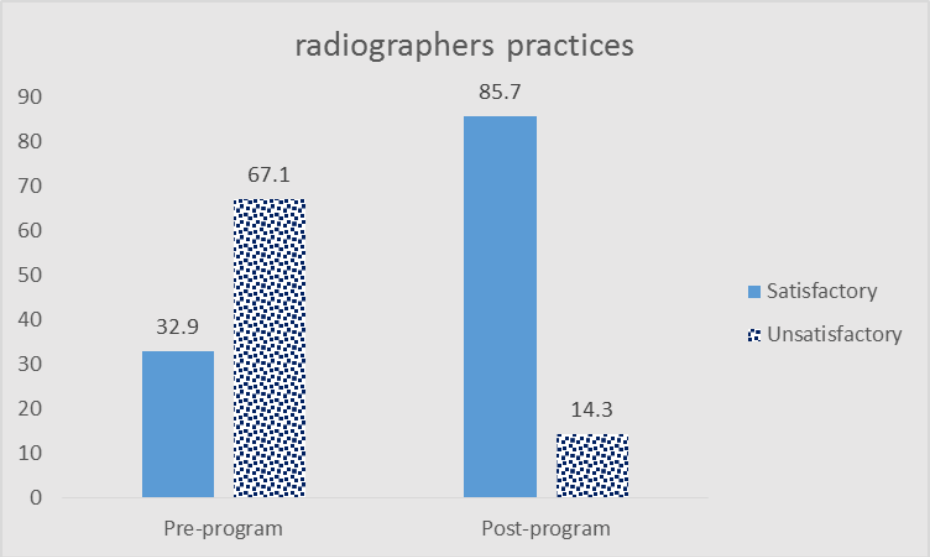

Figure (3): Distribution of studied radiographers regarding their total practices level pre and post program (n=70).

Table (4): Correlation between total knowledge scores and practices among studied radiographers pre and post program implementation regarding dark rooms.

	Total knowledge		p- value	
	pre		post	
total practices	r	p- value	r	p- value
	0.523	0.031*	0.744	.000**

*** Statistically significant difference (P <0.05) ** Highly significant difference (P >0.001)**

Discussion:

Radiographers, as healthcare workers bear the brunt of all the workplace hazards and as well faced with the most significant impact of occupational hazard due to the risk of poor and inadequate diagnostic machines, and poor knowledge regarding infection prevention measures. Radiographers face different types of hazards challenges when conducting routine examinations. These hazards range from physical, psychological, biological, ergonomic and chemical hazards. It is expected that radiographers should ensure standard infection control measures to prevent Healthcare Associated Infections (HAIs). The responsibilities towards infection control should include upholding a safe work environment, choosing suitable risk management and hazard control measures, and using reduction or elimination methods that adhere to health and safety regulations. It is important for radiographers to understand the potential risks of radiation the adverse effects of x-radiation, adequate knowledge of risks of darkroom, safety methods and precautionary measures (**Leesi et al., 2024**).

As regard Socio-demographic characteristics of studied radiographers and work characteristics, the current study showed that; more than one quarter of the studied radiographers aged from 25 to less than 30 with mean and standard deviation was 33.82±7.11. More than two thirds of studied radiographers were male; more than two thirds of them were married. Regarding residence; more than half of studied radiographers lived in rural regions and regarding education level, there were more than one third of them had intermediate university diploma. The prevalence of young radiographers could be attributed to the fact that radiography is a relatively new profession in Egypt; hence the workforce is made up of younger people who have recently graduated from training institutions. Older radiographers are fewer possibly because some may have retired or moved into administrative/managerial positions.

Concerning distribution of studied radiographers regarding the work characteristics, the present study showed that; more than two thirds of the studied radiographers worked for 24 hours, this finding was inconsistent with that of **Abd El-megeed et al., (2019)** who showed that slightly less than two thirds of studied radiographers had work 8hrs /day. Moreover, this finding disagreed with **Mohammed, (2017)** who studied "Ionizing Radiation Hazards and Protection Practices among Radiographers at Cairo University Hospitals" who found that; less than three quarters of radiographers worked for 12 hours.

Regarding to experience years of the studied radiographers, the present study revealed that more than one third had from 6 to 10 years of experience with mean and standard deviation was 8.71±5.44. This indicates they have reasonably good experience in radiography practice, which improves with more years on the job. This result disagrees with **Dauda et al, (2016)** who found that; more than half of the studied sample had working experience less than five years.

The present study revealed that less than three quarters of studied radiographers had not enough income. These might be due to more than half of studied radiographers were married. This result was in the same line with a study done in Nigeria by **Ayenew et al., (2022)** entitled "Prevalence of Work-Related Health Hazard and Associated Factors among Health Workers in Public Health Institutions of Gambella Town, Western Ethiopia: Cross-

Sectional Survey" and reported that radiographers have low-income.

As regarding training courses; more than two thirds of radiographers had training course in first aid. This may due to specialized training has been associated with improved knowledge and practices concerning radiation protection. The result is going line with **Abdullah et al., (2022),** who studied "Evaluation of radiation protection knowledge and practices among radiologic technologists in Erbil city" and concluded that more than half of the participants had undertaken additional radiation safety training outside their basic professional education program.

This result disagreed with **Kargar et al, (2017)** who studied "Assessment of Radiographers' Awareness about Radiation Protection Principles in Hospitals of Bandar Abbas, Iran" and found that; more than three quarters of radiographers received courses about radiation. Also, this result disagreed with **Paolicchi et al, (2016)** who studied "Assessment of Radiation Protection Awareness and knowledge about Radiological Examination Doses among Italian radiographers" and found that; more than one third of radiographers did not receive any radiation safety courses.

Regarding distribution of studied workplace regarding health and safety tools provided to radiographers at work place and presence of standards, the current study cleared that; all of the studied radiographers reported 'yes' regarding occupational health and safety tools provided to radiographers at work place and presence of occupational safety and health standards.

The result is consistent with **Leesi et al., (2024)** who studied "Knowledge of occupational hazards and practice of occupational safety among diagnostic radiographers in university of port Harcourt teaching hospital, rivers state" and reported that 76,8% of the radiographers more than half had good knowledge about occupational health and safety tools.

Regarding Frequency distribution of studied radiographers regarding their knowledge about dark room pre and post program, the present study illustrated that; minority of the studied radiographers had good total knowledge level pre implementation of educational program. But this percentage increased to majority in post implementation of educational program, while less than half of them had poor total knowledge level pre implementation of educational program which decreased to minority in post implementation of educational program after implementation of educational program. This might be due to lack of training courses, which emphasized the urgent need for educational programs for radiation health team regarding dark room.

The result went in line with **Shokeen et al., (2022)** a study entitled "Assessment of Knowledge and Practices about Occupational Radiation Safety among Radiologic Technologists" and reported insufficient hazard awareness among some radiographers. This study agreed with **Eliwa et al., (2018)** who studied "Occupational Health Hazardsand Protective Measures among Radiation Health Team" and stated that majority of technicians had unsatisfactory knowledge. On the same line, a study conducted in Kuwait by **Alotaibi et al., (2012)** entitled **"**Radiation Awareness Among Health Workers in Nuclear Medicine Departments" and found that majority of radiation health workers had unsatisfactory knowledge

In contrast to the current study findings, **Zervides et al., (2020)** who studied "Assessing radiation protection knowledge in

diagnostic radiography in the Republic of Cyprus. A questionnaire survey" and showed that the levels of knowledge in radiation protection of radiographers in the Republic of Cyprus are of a good standard. Also, on the contrary, a study done in Nigeria by **Awosan et al., (2016)** who studied that "Knowledge of Radiation Hazards, Radiation Protection Practices and Clinical Profile of Health Workers in a Teaching Hospital in Northern Nigeria" and found that 59.1% of health workers had good knowledge of radiation hazards. This reflected the differences in the study setting.

In relation to frequency distribution of studied radiographers regarding their health problems pre and post program implementation, the present study illustrated that; more than two thirds of the studied radiographers suffering from health problem pre implementation of educational program which decreased to more than half in post implementation of educational program, while more than one third of them not suffering from health problem pre implementation of educational program which increased to less than half in post implementation of educational program after implementation of educational program. More than half of the studied radiographers suffered from headache in pre implementation of educational heal program compared to less than half in post implementation of educational health program, more than sixth of the radiographers complained of sore throat in pre implementation of educational health program which decreased to less than tenth in pre implementation of educational health program. This might be due to that radiographers were the closest persons to the patients. Additionally, the study participants did not comply with using personal protective equipment

This finding was supported by **Eliwa et al., (2018)** who concluded that three fifths of technicians had health problems related to exposure to radiation at work such as respiratory problems, mainly anemia, slightly more than two thirds of technicians had neurological problems, included headache, less than three fifths of technicians had eye problems and more than two fifths of technicians complained from gastrointestinal problems. In the same context, **Ebrahim et al., (2011)**, in Egypt, a study entitled "Compliance to Safety Measures Toward Radiation Hazards Among the Health Team" and found that more than two thirds of radiation health team complained from sore throat. Similarly, **Ibrahim (2012)**, in Egypt, who studied "Quality of Life Among Radiation Workers" and reported that the majority of radiation workers had unexplained fatigue.

Additionally, Consistent with the previous results a study carried out, by **Goodman (2016)** "Ionizing Radiation Effects and Their Risk to Humans" and emphasized that acute sickness as nausea, vomiting, and diarrhea developing within hours or minutes after being exposed to 2 Sivert dose of radiation.

Regarding distribution of studied radiographers regarding their total practices' items pre and post program implementation, the present study illustrated that; more than two thirds of the studied radiographers had satisfactory total practices' level pre implementation of educational program which increased to majority in post implementation of educational program, while more than three quarters of them had unsatisfactory total practices level pre implementation of educational program, this might be due to a lack of continuing professional development in the study areas and negligence of workshops, which decreased to minority in

post implementation of educational program due to enhancing knowledge and practice after reading the educational booklet and attending the educational lectures.

The present result was incongruent with **Abdularazaq et al., (2024)** who studied "Radiographers Knowledge, Practice, and Compliance with Radiation Protection Measures in the Radiology Department" and reported that the responses showed good practice of radiation protection.

There were highly statistically significant correlation between the studied radiographers' total knowledge and practices (P <0.001). The present result was in accordance with **Keshtkar & Masoumi, (2021**) who studied "Evaluation of Knowledge and Practice of Radiographers and Operating Room Personnel about Radiation Protection: Importance of Training Courses" and reported that there was a significant correlation between knowledge about radiation protection and practice of radiographers. Additionally, these results were in the same line with **Kargar et al., (2017)** who mentioned; the participation in the radiation training courses was significantly correlated with the radiographers' awareness regarding the radiation hazards practice.

Conclusion:

More than half of the studied radiographers suffered from health problems pre implementation of educational health program compared to less than half post implementation of educational program. less than fifth of the studied radiographers had good total knowledge level pre implementation of educational program, but this percentage increased to majority in post implementation of educational program, less than one third of the studied radiographers had satisfactory total practices' level pre implementation of educational program which increased to majority in post implementation of educational program, the studied work environment had safety measure policy related to prevention of radiation hazards, system of consumer protection, and commitment of standers of preventing from radiation, safety measure policy and application of personal protective measurement, while it didn't have safety measure policy related to personal protective equipment, room, Light, ventilation, wall and door.

Recommendations:

1-Health education and continuous intervention classes should be encouraged by radiographers' education team in radiology department for radiographers to improve their knowledge and enhance their practice level and wearing Personal Protective Equipment (PPE).

2-Designing and distributing booklets about dark room effects for radiographers. Those booklets are printed online and on hospital TV channels

3-Establish website data base for all radiographers to recognize health problems and dealing with it.

4-Further studies are proposed to explore the effect of health educational program on increasing radiographers' knowledge and practice regarding darkroom effects on a large sample of radiographers in different settings for the generalization of obtained results.

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برنامج تثقيف صحي لفنيى الأشعة متعلق بتأثير الغرفة المظلمة

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يتعرض فنيو الأشعة لبعض المواد الكيميائية التي تؤدي إلى بعض الآثار الصحية الضارة. ومع ذلك، أفاد فنيو الأشعة بالعديد من الأعراض غير المبررة المرتبطة بالعمل والتي تُعزى إلى أعراض مرض غرفة التحميض. هدفت هذه الدراسة إلى تقييم تأثير البرنامج التعليمي لفنيي الأشعة فيما يتعلق بآثار غرفة التحميض. وتم استخدام تصميم شبه تجريبي في هذه الدراسة. وقد أُجريت الدراسة في قسم الأشعة التابع لمستشفى جامعة بنها على عينة عشوائية من ٧٠ فني أشعة لإجراء هذه الدراسة. وقد اظهرت النتائج انه عانى ٦٤,٣٪ من فنيى الأشعة من مشاكل صحية مثل الصداع والتعب ومشاكل الجهاز التنفسي وقرح الجلد قبل تنفيذ البرنامج الصحي التعليمي، والتي انخفضت إلى ٥١,٤٪ بعد التنفيذ، وكان لدى ١٤,٣٪ من فنيي الأشعة مستوى جيد من المعلومات الكلية قبل تنفيذ البرنامج مقارنة بـ ٨١,٤٪ بعد التنفيذ، وكان لدى ٣٢,٩٪ من فنيى الأشعة ممارسات مرضية. واوصت الدراسة بتنفيذ برنامج تعليمي صحي مستمر لفنيى الأشعة لتحسين معلوماتهم وتعزيز مستوى ممارستهم فيما يتعلق برعايتهم من تأثيرات الغرفة المظلمة.