

# Assessment Health Status of Healthcare Providers who work in Radiation Departments

AYAT IBRAHIM MARHAB<sup>1</sup>, WISSAM JABBAR KASSIM<sup>2</sup>

<sup>1</sup>Community Health Nursing Specialist, PhD(c), Ministry of Health

<sup>2</sup>Department of Community Health Nursing, College of Nursing, University of Baghdad.

Correspondence to: Ayat Ibrahim Marhab, Email: [ayat.ibrahim1106a@conursing.uobaghdad.edu.iq](mailto:ayat.ibrahim1106a@conursing.uobaghdad.edu.iq)

## ABSTRACT

**Background:** Exposure to radiation is becoming a long-term public health issue. Ionizing radiation is a pervasive threat to the lives of everyone on Earth. It's important to keep radiation doses as low as possible, even though the risk of long-term effects is extremely low.

**AIMS:** Assess health status of healthcare providers who work in radiation departments., and to find out the differences between radiation exposure and health status of health care providers .

**Methodology:** The cross-sectional study is conducted throughout the period of (May 10th to August 25th,2021,) in order to assess health status of healthcare providers who work in radiation departments. Purposive sample of (120) healthcare providers were selected from five hospitals in medical city complex. The sample was collected by uses the instruments which consist of two parts: Th Part 1: Healthcare providers' general information, part2: Assessment of health status of healthcare providers : questionnaire validity the instrument was presented to 16 experts in different fields of Nursing to make it more valid. The internal consist reliability determine by crohnpach Alpha correlation which was  $r=0.82$  for health status. Data are analyzed through the application of descriptive statistical data analysis approach that includes, frequencies, percentages, mean of scores, and inferential statistics include which include ANOVA.

**Results:** healthcare providers are showing poor level of physical health as seen among 59.2% of them and 40.8% are showing fair level of physical health, and there are high significant differences in acute exposure to radiation with regard to physical health, psychological health, and emotional health at  $p\text{-value}= 0.002, 0.001, \text{ and } 0.001$ .

**conclusion:** The study concluded that more than half of health care provider have poor physical health ,more than half of health care provider have fair level of social role as part of their health status, more than half of health care providers have the poor psychological status

**Keywords-**Assessment, Radiation exposure, Health care providers

## INTRODUCTION

Many diseases and health issues can be diagnosed with the aid of medical imaging, which has grown in popularity over the past few years. Medical radiation, despite its usefulness in detecting and preventing disease, has been known to have unintended consequences on the health of patients<sup>1,2</sup>

Every day, healthcare workers are put in danger from ionizing radiation. They work with a variety of medical applications that use radiologic technology to diagnose and treat patients. Excessive and long-term exposure to different types of x-ray waves can cause a wide range of health complications for medical professionals. These include skin diseases and hair loss, as well as vision problems, skin problems and genetic disorders. All of these are caused by abnormal DNA functioning<sup>3</sup>.

Healthcare workers are the most likely to be exposed to ionizing radiation. Low-level ionizing radiation exposure has not been studied for its long-term effects, but high-level radiation exposure has been shown to be carcinogenic. When ionizing radiation damages human tissue, it does so in one of two ways. It's imperative to keep doses below the tissue-specific threshold in order to avoid deterministic effects<sup>4</sup>.

## METHODOLOGY

**Design of the study:** Assessing health care providers in Baghdad's medical city complex using a cross-sectional study design . The present study is carried out to assessment health status of healthcare provider who exposure to radiation from (May 10th to August 25th,2021).

**The study sample:** A purposive sample of (120) health care providers is selected through the use of non-probability sampling approach. The study sample includes all healthcare providers who work in radiation departments.

**Study instrument:** The instrument include three parts:

**Part 1:** Healthcare providers' general information:

This part was designed to measure the healthcare provider's demographic characteristics which include: gender, age, occupation, work place, years of experience, are all self-administered variables .

**Part 2:** Assessment of health status of healthcare providers

The researcher use adopted short form health status survey (36) item scale. Several studies were using and adopted short form health status survey (SF-36). this part of questionnaire is included four aspects of health status .

1 Physical health questionnaire: This domain was measured through (2) items relate to the activities that healthcare providers can do during their normal day at the present.

A Physical performance of daily living activities: which include (10) items.

B The physical role: which include (4) items.

2 Social Role: the researcher constructed and structured this domain based on social integration scale through (6) item to measure and described healthcare providers' social participation in the community.

3 Psychological health: The researcher constructed and structured this domain to measure the variable related to psychological health and energy underlying the present study and consist of (9) items relate to the nature of how they feel negative and positive affect.

4 Emotional role: The researcher constructed and structured this domain to measure the variable underlying the present study and consist of (3) items relate to the problems that may encounter during the performance of work as a result of emotional state.

The healthcare providers 'health status items are graded on a "three-level Likert scale: is scored as (3) for always, (2) for sometimes, (1) for never, except the psychological health related negative feeling was scored (1) for always, (2) for sometimes, (3) for never"

The cut of the point is (2) and the low limit for acceptance of health status is (0.66), Mean-Score (MS), Poor= less than (32 – 53), Fair= (54 – 75), Good= more than (76 – 96).

Validity and Reliability: There were 16 experts in different nursing fields who evaluated the instrument's content validity, and the reliability of its items was based on the internal consistency of its Health Status score of 0.82. .

Statistical analysis: In order to statistically analyze the data collected from the study sample to arrive at the results, the researcher used the SPSS version (26.0) and Microsoft Excel

(2010) program to analyze this data and deal with it statistically, to find the differences between the variables, and obtain the final results of the research based on a set of statistical tests.

**RESULTS**

Table 1: Assessment of Physical Health among Healthcare Providers

Physical health	F	%	M	SD
Poor	71	59.2	22.85	2.266
Fair	49	40.8		
Good	0	0		
Total	120	100		

f: Frequency, %: Percentage, M: Mean, SD: Standard Deviation  
 Poor= 14 – 23, Fair= 24 – 33, Good= 34 – 42

This table depicts that healthcare providers are showing poor level of physical health as seen among 59.2% of them and 40.8% are showing fair level of physical health.

Table 2: Assessment of Social Role among Healthcare Providers

Social role	F	%	M	SD
Poor	21	17.5	12.84	2.429
Fair	72	60		
Good	27	22.5		
Total	120	100		

f: Frequency, %: Percentage, M: Mean, SD: Standard Deviation  
 Poor= 6 – 10, Fair= 11 – 14, Good= 15 – 18

This table shows that 60% of healthcare providers are showing fair level of social role as part of their health status.

Table 3: Assessment of Psychological Health among Healthcare Providers

Psychological health	F	%	M	SD
Poor	72	60	15.29	1.492
Fair	48	40		
Good	0	0		
Total	120	100		

f: Frequency, %: Percentage, M: Mean, SD: Standard Deviation  
 Poor= 9 – 15, Fair= 16 – 21, Good= 22 – 27

This table indicates that 60% of healthcare providers are showing poor psychological health and 40% are showing fair level.

Table 4: Assessment of Emotional Health among Healthcare Providers

Emotional health	F	%	M	SD
Poor	65	54.2	5.40	0.854
Fair	54	45		
Good	1	0.8		
Total	120	100		

f: Frequency, %: Percentage, M: Mean, SD: Standard Deviation  
 Poor= 3 – 5, Fair= 6 – 7, Good= 8 – 9

This table reveals that healthcare providers are with low to moderate emotional health as seen among 54.2% with poor level and 45% are with fair level.

Table 5: Analysis of Variance for Acute Exposure of Radiation Dose with regard to Health Status of Healthcare Providers (N=120)

Acute Health status	Source of variance	Sum of Squares	Df	Mean Square	F	Sig.
Physical	Between Groups	130.869	10	13.087	2.969	.002
	Within Groups	480.431	109	4.408		
	Total	611.300	119			
Social	Between Groups	89.226	10	8.923	1.587	.120
	Within Groups	612.765	109	5.622		
	Total	701.992	119			
Psychological	Between Groups	90.914	10	9.091	5.699	.001
	Within Groups	173.878	109	1.595		
	Total	264.792	119			
Emotional	Between Groups	20.205	10	2.020	3.307	.001
	Within Groups	66.595	109	.611		
	Total	86.800	119			
Overall health	Between Groups	208.125	10	20.812	1.847	.061
	Within Groups	1228.242	109	11.268		
	Total	1436.367	119			

“df: Degree of freedom, F: F-statistic, Sig: Significance”

This table indicates that there are high significant differences in acute exposure to radiation with regard to physical health, psychological health, and emotional health at p-value= 0.002, 0.001, and 0.001.

Table 6): Analysis of Variance for Chronic Exposure of Radiation Dose with regard to Health Status of Healthcare Providers (N=120)

Chronic Health status	Source of variance	Sum of Squares	Df	Mean Square	F	Sig.
Physical	Between Groups	94.385	9	10.487	2.232	.025
	Within Groups	516.915	110	4.699		
	Total	611.300	119			
Social	Between Groups	52.972	9	5.886	.998	.446
	Within Groups	649.020	110	5.900		
	Total	701.992	119			
Psychological	Between Groups	15.944	9	1.772	.783	.632
	Within Groups	248.848	110	2.262		
	Total	264.792	119			
Emotional	Between Groups	10.034	9	1.115	1.598	.125
	Within Groups	76.766	110	.698		
	Total	86.800	119			
Overall health	Between Groups	135.568	9	15.063	1.274	.259
	Within Groups	1300.799	110	11.825		
	Total	1436.367	119			

“df: Degree of freedom, F: F-statistic, Sig: Significance”

This table indicates that there is significant difference in chronic exposure to radiation with regard to physical health at p-value= 0.025.

**DISCUSSION**

Concerning Physical Health among Healthcare Providers, the findings show that More than half healthcare providers are showing poor level of physical health.

This finding in similarity with cross-sectional study, Health care workers who have been exposed to ionizing radiation can be assessed for oxidative stress by measuring lipid peroxidation, antioxidant levels, and the complete blood count (CBC) of those exposed to the radiation. The exposure group's most common hematological health threat was anemia<sup>5</sup>

The Chronic exposure to IR -even at small doses- can lead to significant health complaints (adverse health effects) and affect general health status among exposed group coworkers, according to a comparative cross-sectional study conducted in Egypt, which included 50 health care workers to identify the adverse health effects of exposure to low doses of ionizing radiation<sup>6</sup>

Concerning Assessment of Social Role among Healthcare Providers, the findings show that, more than half of healthcare providers are showing fair level of social role as part of their health status. This is consistent with study that conducted to determine the health-related quality of life (HRQoL), fatigue, and posttraumatic growth (PTG) among patients with breast or prostate cancer during and following radiation therapy<sup>7</sup>.

Regarding Assessment of Psychological Health among Healthcare Providers, the findings indicates that more than half of healthcare providers are showing poor psychological health. This findings consistent with study which conducted about, and reported that, Long-term radiation exposure heightens the psychological toll, resulting in increased levels of work-related stress and exhaustion for those in this profession. 53.08 percent and 63.32 percent of medical radiation staff reported experiencing job stress and burnout, which was higher than the rate of nonmedical workers in China<sup>8</sup>.

With respect to Assessment of Emotional Health among Healthcare Providers, reveals that more than half healthcare providers are poor level emotional health.

A cross-sectional study that conducted to assess of Health Professionals' Attitudes on Radiation Protection Measures, reported that participants express physical complaints caused by their negative emotions due to radiation exposure<sup>9</sup>.

A survey study stated that a nuclear accident raises public concern about the health effects of radiation, which has a negative impact on the mental health of those affected<sup>10</sup>.

Analysis of Variance for Acute Exposure of Radiation Dose with regard to Health Status of Healthcare Providers, At p-values of 0.002, 0.001, and 0.001, the results show that acute radiation exposure has a significant effect on physical health, psychological health, and emotional health. findings that are similar to those made by , which found that Data showed that all rates of quality of life were significantly lower in the Abay district population compared to the control group<sup>11</sup>. The 'general health' and 'viability' scales recorded the lowest quality of life scores (56.55, 62.08, and 64.36, respectively, in the studied groups) (59.89, 63.89 and 62.26 respectively). There was a statistically significant decrease in the quality of life for residents living in the radiation contaminated territories with the highest radiation doses (82.85, 88.5, and 89.37, respectively).

Analysis of Variance for Chronic Exposure of Radiation Dose with regard to Health Status of Healthcare Providers, the findings indicates that there is significant difference in chronic exposure to radiation with regard to physical health at p-value= 0.025.

Patients with oropharyngeal or epipharyngeal cancer who had received radiation to the hypothalamus and pituitary gland were found to have received a median accumulated dose of 1.9 Gy (1.5–2.2 Gy) to the hypothalamus and 2.4 Gy (1.8–3.3 Gy) to the pituitary gland, respectively, according to a case-control study Compared with their matched controls, the patients displayed significantly higher levels of anxiety and depression as well as lower vitality<sup>12</sup>.

Additionally, In Tangshan in 2010, a retrospective analysis of 1392 radiation workers in a healthcare setting reported that radiation workers may be adversely affected by chronic low-level ionizing radiation exposure<sup>13</sup>.

## CONCLUSION

The study concluded that more than half of health care provider have poor physical health ,more than half of health care provider have fair level of social role as part of their health status, more than half of health care providers have the poor psychological status, more than half of health care providers have the poor emotional health, There was a non-significant impact of exposure to radiation upon the health status of healthcare providers, acute exposure to radiation has been influenced physical health, psychological health, and emotional health, and There was significant difference between chronic exposure to radiation and physical health

**Recommendation:** Study findings and conclusions have led researchers to recommend these actions:

1 Radiation safety regulations necessitate ongoing in-service training and monitoring of those who are exposed to radiation on the job.

2 Personal ionizing radiation monitoring, routine medical examinations, and a higher standard of protection for those in the workforce who are exposed to it are all vital.

## REFERENCES

- Awosan, K., Ibrahim, M., Saidu, S., Ma'aji, S., Danfulani, M., Yunusa, E., . . . Ige, T. (2016). Knowledge of radiation hazards, radiation protection practices and clinical profile of health workers in a teaching hospital in Northern Nigeria. *Journal of Clinical And Diagnostic Research*, 10(8), 7-12. doi:10.7860/jcdr/2016/20398.8394
- Dobrescu, L., & Rădulescu, G. (2015). Radiation dose risk and diagnostic benefit in imaging investigations. *American Journal of Bioscience and Bioengineering*, 3(3), 22-26.
- Behzadmehr, R., Doostkami, M., Sarchahi, Z., Saleh, L. D., & Behzadmehr, R. (2020). Radiation protection among health care workers: knowledge, attitude, practice, and clinical recommendations: a systematic review. *Reviews on environmental health*.
- Abosala, A. (2018). A report on occupational ionizing radiation exposure by an orthopedic surgeon in a national health-care setting-clinical case perspective. *Journal of Orthopaedic Case Reports*, 8(3), 81.
- Bolbol, S. A., Zaitoun, M. F., Abou El-Magd, S. A., & Mohammed, N. A. (2021). Healthcare workers exposure to ionizing radiation: Oxidative stress and antioxidant response. *Indian Journal of Occupational and Environmental Medicine*, 25(2), 72
- Abbas, D., Gabal, M. S., Ez-Elarab, H. S., El Khazragy, N. N., & Manzour, A. F. (2021). Health Risks of Low Dose Of Ionizing Radiation Among Health Care Providers at ain Shams University Hospitals. *QJM: An International Journal of Medicine*, 114(Supplement\_1), hcab118-001.
- Zhang, Z., Lu, Y., Yong, X., Li, J., & Liu, J. (2020). Effects of Occupational Radiation Exposure on Job Stress and Job Burnout of Medical Staff in Xinjiang, China: A Cross-Sectional Study. *Medical Science Monitor: International Medical Journal of Experimental and Clinical Research*, 26, e927848-1.
- Goula, A., Chatzis, A., Stamouli, M. A., Kelesi, M., Kaba, E., & Brilakis, E. (2021). Assessment of Health Professionals' Attitudes on Radiation Protection Measures. *International journal of environmental research and public health*, 18(24), 13380.
- Kashiwazaki, Y., Takebayashi, Y., & Murakami, M. (2020). Relationships between radiation risk perception and health anxiety, and contribution of mindfulness to alleviating psychological distress after the Fukushima accident: Cross-sectional study using a path model. *PLoS one*, 15(7), e0235517.
- Pivina, L., Semenova, Y., Manatova, A., Belikhina, T., Bulegenov, T., Mukhamedova, A., & Zhunussova, T. (2018). Assessment of quality of life in the descendants of people exposed to radiation in Kazakhstan. *European Journal of Public Health*, 28(suppl\_4), cky214-075.
- Löfdahl, E., Berg, G., Johansson, K. A., Zachrisson, M. L., Malmgren, H., Mercke, C., ... & Johannsson, G. (2012). Compromised quality of life in adult patients who have received a radiation dose towards the basal part of the brain. A case-control study in long-term survivors from cancer in the head and neck region. *Radiation Oncology*, 7(1), 1-10.
- Qian, Q. Z., Cao, X. K., Shen, F. H., & Wang, Q. (2016). Effects of ionising radiation on micronucleus formation and chromosomal aberrations in Chinese radiation workers. *Radiation protection dosimetry*, 168(2), 197-203.