



## **Radiation Safety Awareness among Healthcare Workers in Middle Eastern Countries**

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### **Authors' contributions**

*This work was carried out in collaboration between all authors. Authors BK and NM designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author SDK managed the literature searches. All authors read and approved the final manuscript.*

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**Review Article**

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### **ABSTRACT**

Aim of the study is to review the awareness level of radiation risks in health care sectors among healthcare workers in Middle Eastern countries. This is an intensive literature review study. Search was done using google scholar, PubMed and Science Direct engines, with key words like The Search was limited to articles written in English which were published from January 2005 through June 2016. Only original papers that described health care worker's knowledge on radiation safety and radiation risk in the hospitals and clinics were included. We excluded studies described medical and health science student's knowledge on radiation safety and those published before year 2005. A total of 28 articles were screened from initial review and only twelve papers meet our inclusion criteria, out of this six papers described doctor's knowledge, three of them described radiographers, and two of them described medical staffs and only one paper described nurse's knowledge. Most of the studies reported that level of knowledge was less than 50% among the healthcare workers. Base on the available articles we have found that level of knowledge of health care workers was very poor in the Middle Eastern countries.

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## 1. INTRODUCTION

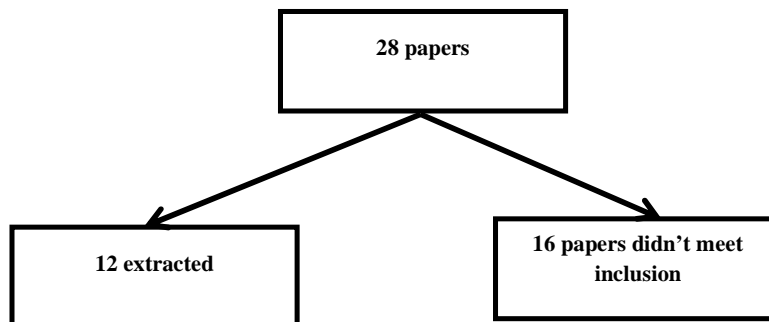
People are exposed to natural radiation sources as well as human-made sources on a daily basis. Natural radiation comes from many sources including more than 60 naturally-occurring radioactive materials found in soil, water and air. Radon, a naturally-occurring gas, emanates from rock and soil and is the main source of natural radiation. Every day, people inhale and ingest radionuclides from air, food and water [1]. Since the end of the 19th Century, man has learned to use radiation for many beneficial purposes. Today, many sources of radiation, such as X-ray machines, linear accelerators and radionuclides are used in clinical and research applications. Such beneficial uses may at times create potentially hazardous situations for personnel who work within the hospital [2]. The use of ionizing radiation in medicine has led to major improvements in the diagnosis and treatment of human diseases. More than 3,600 million X-ray examinations are performed, 37 million nuclear medicine procedures are carried out, and 7.5 million radiotherapy treatments are given every year worldwide [3]. Some studies were conducted among the health care workers to evaluate knowledge level on radiation safety. A study reported that nearly all nurses working in Nuclear Medicine Departments (NMDs) in Kuwait are not aware of the radiation protection and risks. This lack of awareness has serious implications on both patients and nurses [4]. Most of the doctors and intern doctors underestimated real radiation doses [5]. The level of radiation dose and protection awareness amongst radiographers in the sampled Jordanian hospitals is inadequate [6]. These days, the most common human-made sources of ionizing radiation are medical devices. To know radiation safety is essential for health care workers.

However, very limited data were available on awareness re radiation safely among health care workers.

Aim of the study is to review the awareness level of radiation risks in health care sectors among healthcare workers in Middle Eastern countries.

## 2. METHODS

This is an intensive literature review study. We conducted a review of published articles on radiation Safety awareness among healthcare workers in Middle Eastern countries (There are 17 countries in the Middle Eastern Region based on Geographic location, the countries are Bahrain, Iraq, Iran, Israel, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syria, United Arab Emirates, Yemen, Cyprus, Turkey). The literature searches were conducted using Google scholar, PubMed and Science Direct engines using key words like "Radiation safety", "Radiation risk", "Radiation awareness", "Health care workers" and "Middle Eastern countries" and were limited to articles written in English. The Search was conducted from July 1, 2016, till August 31, 2016. All relevant publications during the period January 2005 through June 2016 were collected. Only original research papers were included. Review papers and studies among the population except health care workers were excluded. We masked the results of all publication selected for full review by obscuring them with a red marker from the tables and text. Our agreement on studies evaluated within the team was good and all disagreements were solved by consensus which required individuals to discuss the reasoning for their decisions. Based on the inclusion criteria, this screening process yielded 12 original publications identified by team (Fig. 1).



**Fig. 1. Flow diagram for the process of review of the papers**

### 3. RESULTS AND DISCUSSION

Table 1 presents selected published papers from the Middle Eastern countries. Total 12 articles were selected from seven countries while there is no publication from 10 countries in the region. One paper was selected from Kuwait, the paper reported nurse’s knowledge on radiation safety. Two papers were selected from Saudi Arabia; one of the papers was carried out among the physicians and another one among radiographers. Three papers were selected from Turkey; one of the three papers was carried out among Physicians, nurses, medical technicians,

the second one was carried out among doctors and third one was carried among medical staffs. Two papers were selected from Iran, one of them was carried out among doctors and patients and we only considered the doctors knowledge score, the second papers was carried out physicians. One paper was selected from Palestine; the study was carried out among doctors. Two papers were selected from Jordan and both papers were carried out among the radiographers. One paper was selected from Egypt and the study was carried out among the physicians.

**Table 1. List of the extracted articles from the Middle Eastern countries**

No	Title of the paper	Study design	Study population	Study sample	Year of publication	Country	Knowledge level	Reference
1	Radiation awareness among nurses in nuclear medicine departments	cross-sectional survey	Nurses	21	2015	Kuwait	67%	[4]
2	Awareness of Non-Radiological Background Saudi Physicians Regarding Risk of CT-Scan’s Radiation on Children	cross-sectional survey	Physicians	105	2016	Saudi Arabia	48.6%	[7]
3	Knowledge and Performance of Radiographers towards Radiation Protection, Taif, Saudi Arabia	cross-sectional survey	Radiographers	75	2015	Saudi Arabia	41.30%	[8]
4	Evaluation of Awareness on Radiation Protection and Knowledge About Radiological Examinations in Healthcare Professionals Who Use Ionized Radiation at Work	cross-sectional survey	Physicians, nurses, medical technicians	92	2014	Turkey	Very week	[9]
5	Doctors’ and intern doctors’ knowledge about patients’ ionizing radiation exposure doses during common radiological examinations	cross-sectional survey	Doctors	177	2007	Turkey	week	[10]
6	Radiation Safety Awareness in Medical Staff	cross-sectional survey	Medical staff	184	2013	Turkey	week	[11]

No	Title of the paper	Study design	Study population	Study sample	Year of publication	Country	Knowledge level	Reference
7	Radiation Safety Awareness amongst Staff and Patients in the Hospitals	cross-sectional survey	Doctors and patients	173	2014	Iran	71.1%	[12]
8	Iranian physicians' knowledge about radiation dose, received by patients in diagnostic radiology	cross-sectional survey	Physicians	155	2009	Iran	58.3%	[13]
9	Assessment of physicians' knowledge and awareness about the hazards of radiological examinations on the health of their patients	cross-sectional survey	Doctors	163	2012	Palestine	Very low	[14]
10	Radiation dose awareness of radiologic technologists in major Jordanian hospitals	cross-sectional survey	Radiographers	85	2016	Jordan	Less than 50%	[15]
11	Radiobiology Knowledge Level of Radiologists	cross-sectional survey	Radiographers	23	2016	Jordan	59%	[16]
12	Assessment of Physicians' Knowledge, Attitude and Practices of Radiation Safety at Suez Canal University Hospital, Egypt	cross-sectional survey	Physicians	120	2015	Egypt	56.5%	[17]

### 3.1 Discussion

There is no study found in 10 countries out of 17 countries in the Middle Eastern countries. Base on the available articles we have found that level of knowledge of health care workers was very poor in the Middle Eastern countries. Study from Kuwait was carried out only 22 nurses, the study population was small. Three papers were selected from Turkey and all of them did not report total knowledge score on radiation safety. More than half of the selected papers were carried out among doctors and three of them were carried out among the radiographer and only one study was carried out among nurse. When we discuss our review, there are some limitations. One of the limitations is fact that this search was limit only in English Language, only original studies were included and Searching

engine was limit to three main scientific engines. For future research searches shouldn't limit only English language because some papers may publish in Arabic, Turkish and Persian languages. Short course should be conducted on radiation safety for the health care workers.

### 4. CONCLUSION

There are 17 countries in Middle East based on geographic region but out of 17 countries, only 7 countries were conducted study. The study sample was very small of Kuwait study; it is difficult to generalize the results of the study to the all nurses in the hospital. Palestine study was carried out among doctors but the knowledge level was very low. There were two studies from Jordan and both of them carried out among radiographers it would better if one of the studies

were examined different group and also one of the studies sample was small. Turkish Studies didn't report total knowledge score and most of the studies reported that level of knowledge score was less than 50% among the healthcare workers. Generally, the level of knowledge of health care workers was very poor in the Middle Eastern countries base on the available articles.

## CONSENT

It is not applicable.

## ETHICAL APPROVAL

It is not applicable.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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