

Ionizing Radiation Among Saudi Females: Awareness and Staff Efforts

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ABSTRACT

Background: Radio-diagnostics has become widespread nowadays for identification of diseases, however, a lot of patients, especially females of reproductive age lack awareness of risk factors involved with ionizing radiations. This study aimed to assess the awareness regarding the risk of radiation exposure to female patients and evaluation of the medical staffs' efforts to exclude pregnancy prior to sending patients for radiology examination.

Methods: Three-part questionnaires were used for evaluation of reproductive aged female patients who were undergoing investigations with ionizing radiations in January 2017 at Radiology Department in King Abdul-Aziz University Hospital, Jeddah, Saudi Arabia.

Results: 43.7%, 65.3%, and 89.6% of physicians, radiologists and receptionists respectively, ask about pregnancy while only a few of them asked about possibility of pregnancy and the first day in last menstrual cycle of the patient. Overall, 91 % and 75.2% of patients estimated the risk of cancer from chest radiography and CT respectively; being very small. However, 76.6% of patients correctly thought that CT gave more amounts of radiation than X-rays and 61.3% of patients agreed that it is more important for their physician to diagnose their condition with CT than to worry about the radiation exposure.

Conclusion: These data suggests that females have incomplete understanding about risks associate with radiations, in addition to which most of clinical practitioners also do not ask about the possibility of pregnancy which puts patients at a greater risk.

Keywords: Awareness; Females; Pregnancy; Risks; Radiation.

INTRODUCTION

Nowadays, ionizing radiation has become an important technique used for patients' imaging in many diagnostic radiology and nuclear medicine procedures ⁽¹⁾. In the United States alone, use of Computed Tomography (CT) has increased to more than 70 million scans per year ⁽²⁾.

However, little efforts are being made by the healthcare providers to spread the awareness about the harmful effects of these radiations. It is essential for physicians to determine the awareness of the patients regarding exposure to radiation ⁽³⁾. The International Commission on Radiological Protection (ICRP) stated that each year large numbers of pregnant women are exposed to ionizing radiation ⁽⁴⁾. It is the duty of clinical physicians and health professionals to discuss the risk of ionizing radiations during or before pregnancy with their female patients who are in the reproductive age since these radiations are very harmful for the developing fetus ⁽⁵⁾. Due to the unintentional exposure of embryo to radiations, some institutions demand the documentation of pregnancy prior to sending the

female patients who are in the reproductive age for radiological examination ⁽⁶⁾. Over the last decade, the fear regarding exposure to radiation and radiation-induced ionization has raised exceedingly ⁽⁷⁾.

A study done by Youssef et al. showed that large number of their participants thought that doctors should inform their patients regarding the benefits and risks of X-rays and CT scans, and most of their participants did not appreciate the differences in the rate of radiation that patients are exposed to in either X-rays or CT scans ⁽⁸⁾. Another study revealed that the majority of their participants did not know the amount of risks associated with radiations from CT scans ⁽³⁾. A study conducted in USA reported that primary care physicians and residents rarely explain the advantages and disadvantages of CT scans with their patients ⁽⁵⁾.

To the best of our knowledge, there is a lack of adequate research to assess the level of awareness regarding the risk of ionizing radiation exposure of female patients, especially in Saudi Arabia.

Therefore, this study was designed to assess the level of awareness regarding the risk of ionizing radiation exposure of female patients who attended the radiology department in King Abdul-Aziz University Hospital, Jeddah, Saudi Arabia, and to evaluate the medical staffs' efforts to exclude pregnancy prior to sending patients for radiological imaging.

MATERIALS AND METHODS

This study was approved by the Ethical committee of King Abdul-Aziz University hospital.

A cross sectional survey was conducted by interviewing a total of 222 females who were undergoing any radiological investigation with exposure of ionizing radiation (X-rays, CT) at King Abdul-Aziz university hospital Jeddah, Saudi Arabia in January 2017.

All females at the reproductive age who were undergoing any procedure that includes any amount of radiation was considered as inclusion criterion for this study. Reproductive age was defined according to World Health Organization as the period between 15 years of age and 49 years of age. All males, postmenopausal women and patients who could not do the survey were excluded from this study.

The study was done after approval of ethical board of King Abdulaziz university.

Data collection and measurements

The research was done by using a three-part questionnaire. The first part had participant's demographic data.

The second part was a validated questionnaire which was used to measure the awareness of the patients who were going to be exposed to any type of ionizing radiation in a previous study used. Awareness was measured by asking relevant questions about the over-all risk and benefits of ionizing radiation and

difference between X- rays and CT scans ⁽³⁾. The third part of the questionnaire was formulated by the research team to measure the attitude of the hospital staff to exclude the possibility of pregnancy among patients undergoing a procedure that will expose them to ionizing radiation, by asking the patients if the clinician, staff, and reception asked them about pregnancy (Table 1).

Table 1. Three-part questionnaire used in the study

	Description of Parts	Main questions
Part 1	Demographic data	Included: age, nationality, level of education, income, number of radiological studies.
Part 2	The awareness the risk of exposure to ionizing radiation	Participants were asked what they believe that how much radiation is there in a single CT scan as compared to a chest X-ray, what is the long-term risk of developing cancer after a single chest x-ray, risk of developing cancer after a single CT scan, is it more important to figure out a diagnosis using a CT scan than to worry about the radiation from a CT scan, Is it more important to discuss the risks and benefits of a test than to use doctor's own judgment, which radiology test performance is preferable: balancing a better test and more radiation vs. a less defining test and less radiation on the following line
Part 3	The attitude of the hospital staff to exclude the possibility of pregnancy among patients undergoing ionizing radiation	Participants were asked if the physician/radiologist/receptionist asked them about pregnancy and 1 st day of the last menstrual period

Statistical analysis

Data entry was done using Microsoft excel version 15.13, Statistical analysis was performed using SPSS software package version 23. Mean of age and percent and frequencies for categorical variables summarized the descriptive statistics.

The study was done after approval of ethical board of King Abdulaziz university.

Results

Demographic data

A total of 222 participates underwent at least one CT examination or X-ray during the study period and met the inclusion criteria. The mean age is 37.32. 67.6% of them had high school education or more. 43.2% had a monthly income ranging from 1000 to 3000 SAR

Response

Most of physician, radiologist, and receptionists asked about pregnancy amounting to 43.7%, 65.3%, and 89.6%, respectively, and only 9%, 1.8%, and 9.4% of physician, radiologist, and receptionists, respectively, asked about the possibility of pregnancy and first day in last menstrual cycle of the patient as summarized in (Table 2).

Table 2. Frequencies and percentages of patient answers about the questionnaire

Response	Frequency	Percent
Significantly less	4	1.8
Less	6	2.7
A little less	11	4.9
The same	31	14.0
A little more	36	16.2
More	67	30.2
Significantly more	67	30.2
Total	222	100

Overall, 91 % and 75.2% of patients estimated the risk of cancer being none, very small, or small from chest radiography and CT, respectively. 76.6% of patients correctly thought that CT gave more amounts of radiation than chest radiography, 30.2% more accurately believing that a CT examination gave significantly greater amounts of radiation. 14% of patients incorrectly thought that CT gave same radiation as chest radiography, and only 9.5% incorrectly thought that CT gave less radiation than chest radiography. The result is summarized in (Table 3).

Table 3. Answers for question "I believe that the radiation from a single CT scan in comparison to a chest X-ray is"

Questions	Physician		Radiologist		Receptionist	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
He didn't ask you about pregnancy	79	35.6	64	28.8	1	0.5
He just ask you about pregnancy	97	43.7	145	65.3	199	89.6
If there is a possibility of pregnancy and he did ask about the first day in your last menstrual cycle	20	9	4	1.8	21	9.4
If there is a possibility of pregnancy but he didn't ask about the first day in you last menstrual cycle	26	11.7	9	4.1	1	0.5
Total	222	100	222	100	222	100

Attitude

Overall, 61.3% of patients weekly agreed, agreed, or strongly agreed that it is more important for their physician to diagnose their condition with CT than to worry about the radiation from the CT examination as shown in (Table 4).

Furthermore, 68% of patients agreed or strongly agreed that it is more important for them that the physician should discuss the risks and benefits of a test than to use his or her judgment to order the best diagnostic test (Table 5).

52.7% of patient prefer to perform a better test with more radiation than to do a less define test with less radiation.

Table 4. Answers for question "it is more important for my doctor to figure out what might be wrong with me using a CT scan than to worry about the radiation from a CT scan

Response	Frequency	Percent
Strongly Disagree	23	10.4
Disagree	26	11.7
Mighty Disagree	14	6.3
No opinion	23	10.4
Weekly agree	23	10.4
Agree	49	22.1
Strongly Agree	64	28.8
Total	222	100.0

"

Table 5. Answers for question "it is more important for my doctor to take the time to discuss the risks and benefits of a test than to use his or her judgment and order the best test for diagnosing my problem"

Response	Frequency	Percent
Strongly disagree	11	4.9
Disagree	24	10.8
Mighty Disagree	7	3.2
No opinion	15	6.8
Weekly agree	14	6.3
Agree	44	19.8
Strongly Agree	107	48.2
Total	222	100.0

DISCUSSION

For radio diagnostics, there is a set of guidelines that needs to be followed by every health care provider. Most guidelines advise to ask about pregnancy and the last menstrual period especially from the referring physicians and need to provide the radiologists and radiology technicians with full documentation of patient information ⁽⁹⁾. Although, we found that 43.7% of physicians, 65.3% of radiologist and 89.6% of receptionists asked about pregnancy while only a few of them asked about the LMP, a result which is similar to other study conducted in Nigeria where it was found that only 2.1% of physicians ask about the LMP ⁽⁶⁾. This is most likely due to the fact most physicians and practitioners lack the proper knowledge of the risks of ionizing radiation in pregnant females ⁽¹⁰⁾.

We found that a maximum number of patients considered the risk of cancer from a single chest radiography and CT being very small, a finding similar to another survey conducted in USA ⁽¹¹⁾. However, most of patients correctly thought that CT gave more amounts of radiation than chest x-ray which disagrees with a study conducted in USA which had only 34% of patients acknowledging that CT produces more radiation than X-ray ⁽⁵⁾. This percentage difference could be duo to the socio-demographic differences of the participants.

Unfortunately, most patients have incomplete understanding of the diagnostic radiation modalities ⁽³⁾.

More than half of the patients agreed that it is more important for their physician to discuss the risks and benefits of a test than to use his or her judgment to order the best diagnostic test which is an important step to be implemented in the routine clinical practice as in a study conducted in Ethiopia which has found that 48.4% of patients have very little information about the advantages and disadvantages of using certain diagnostic radiation modalities ⁽¹²⁾.

Although 61.3% of patients agreed that it is more important for their physician to diagnose their condition with CT than to worry about the radiation and 52.7% of patient prefer to perform a better test with more radiation. All this indicates the lack of the public knowledge regarding the radiation hazards especially in reproductive aged females which agrees with a study conducted previously ⁽¹³⁾.

These differences could be due to multiple factors which include: education, socio-economic

status, and stage of illness and disability of the patient.

CONCLUSION

Female patients have incomplete understanding regarding the advantages and disadvantages of different diagnostic radiation modalities, in addition most of clinical practitioners do not ask about the possibility of pregnancy which puts the patient to a greater risk. So, we recommend spreading awareness and conducting courses for clinical practitioners regarding radiation protective measures, especially for reproductive aged women.

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