

# The Knowledge of Radiation Hazard between Health and Medical Technology Students at Al-Zahra University in Karbala-Iraq

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*Abstract: Study of the health and medical technology student's knowledge and attitudes will open the ways to solve the deficit in their information regarding radiation hazards. The aim is to assess the knowledge of Al-Zahra university students toward radiation hazard. This study is a cross-sectional observational analytical study of the amount of knowledge and altitude towards radiation hazards and protection of the Health and Medical Technology students' of Al-Zahra University in Karbala, Iraq. This cross-sectional questionnaire-based study was conducted on 129 out of 132 undergraduate students from The Health and Medical Technology College, whose curriculum included General Radiology, after completing 90 days in the Department of Radiological Techniques at Al-Zahra University for Women. Among 132 students, 129 students participated in this Google Classroom questionnaire, giving an overall response rate of (97.7%). Their overall knowledge was good and showed a higher KAP value in relation to hazardous protection that (Is x ray is harmful) with a percentage of (66.6%), while their knowledge was poor concerning the safety guidelines. The lack of knowledge about ALARA or ALADA principles needs to be considered by updating first year student's curriculum as well as creating training courses to improve their knowledge.*

*Key words: Knowledge, Radiation Hazards, Undergraduate, Karbala*

**Introduction:**

This study focuses on the knowledge of undergraduate students of Health and Medical Technology concerning radiation hazards and protection.

Radiation has always been present in the overall environment. However, mankind was not directly conscious of its existence until the end of the 19th century, when a compilation of scientific discoveries were made [1]. The International Commission on Radiological Protection (ICRP) is one of the essential organizations that are concerned with the protection against ionizing radiation [2]. Although radiological doses are rather low and the chances of any late effects are slight, it should nevertheless be kept as low as possible [3]. X-Rays have the ability to pierce through human tissues [4]. In general, the greater the amount of radiation strikes a cell, the greater the chances of causing an effect may find place. If a significant number of cells are affected, the organism may be damaged or die [5]. Increasing medical doctors' knowledge concerning radiation hazards is a part of the radiation protection programs. [6] Implementing periodic radiation safety training for occupational workers would be beneficial to practice a radiation safety culture [7]. Radiation hazard is harmful and it becomes precarious when there is a professional malpractice or ignorance [8]. According to the position distance rule, the radiographer's position should be at least 6 feet away from the source at an angle of 90° to 135° to the central X-Ray beam [9]. Radiographic investigations in medicine cause radiation exposure to both the patient and the radiographer, and care is to be taken to protect both. [10] Radiographs is a vital diagnostic tool for dental professionals [11]. The present occupational exposure limits have been established to ensure that no individual will suffer deterministic effects and that the probability for stochastic effects is as low as reasonably and economically possible [12].

**Materials and Methods:**

This cross-sectional questionnaire-based study conducted on 132 undergraduate students of Health and Medical Technology whose curriculum included general Radiology after completing their 90 days in the Department of Radiological Techniques at Al-Zahra University for girls as first year students. Out of 132 students, 129 students had participated in this study. This study is an analytical study of the knowledge towards radiation hazards and protection between health

and medical technology. The questionnaire was cited and slightly modified from Bahija Basheer\* et al. [6].

Ethical approval was obtained from the independents ethics committee of Al-Zahra University in Karbala-Iraq prior to the study. The period of research and data collection was between September 2019 and August 2020. Questionnaires were distributed among the students using Google Classroom and were returned by the students after completing using the same way. The questionnaire was pilot-tested and specifically designed for their study comprising of 15 leading questions. Among the 15 questions; 14 were close ended, while there was one was leading question. The questionnaire is related to the radiological hazards of radiographs and radiation protocol in the form of multiple choices given to each participant. This questionnaire comprised of the following two sections with 15 questions:

1. Socio-demographic data such as age and place of residence.
2. Knowledge regarding radiological hazards of radiation.
3. Attitude of the students towards radiation protection.

Statistical tests used Chi-square and the p-value was set to a value of 0.05.

### Results:

Out of 132 students who were invited to participate in the study, a total 129 students had joined this study, giving an overall response rate of (97.7%). (Table 1) shows residency, marital status and the age of the students. The average age of the students was  $11.27 \pm 5.23$ . Out of 132 students only 16 (12.6%) were married. Most students are in between 18-20 years old. The majority of students, 88 (69.3%) were from Karbala governorate, while 39 (30.7%) were from other Iraqi governorates.

**Table 1: Residency, Marital Status and Age of Students**

Variable	Category N (%)	
Governorate	Karbala	88(69.3%)

	Outside Karbala	39(30.7%)
Marital status	married	16(12.6%)
	unmarried	111(87.4%)
Age	Below 17	1(0.8%)
	18-20	101(79.5%)
	21-29	22(17.2%)

Table 2: Shows the distribution of the students according to their knowledge about X-Rays with regards to safety guidelines, safe distance, exposure and protective measures. (66.6%) was the percentage that showed knowledge of higher KAP value in relation to hazardous protection and that (X-rays are harmful). While their knowledge was poor about safety guidelines; case of Awareness of ALARA or ALADA principle was (21%), and an estimated knowledge of (46.5%) about NCRP Awareness of and ICRP recommendations, while they had moderate knowledge about High speed film which is required in a reduce exposure with a percentage of (29.4%).

**Table 2: Knowledge of the Students towards Radiation Protection**

No	Knowledge item	Response	N (%)
1	Is X-Ray is harmful	Yes	86(66.6%)
		No	35(27.1%)
		I don't know	5(3.9%)
2	reflected from X-Ray beams are walls	Yes	57(44.1%)
		No	51(39.5%)
		I don't know	19(14.7%)
3	Awareness of NCRP and ICRP recommendations	Yes	60(46.5%)
		No	20(15.5%)
		I don't know	43(33.3%)
4	Awareness of the usefulness of collimators	Yes	72(55.8%)
		No	52(40.3%)

	and filters in radiography	I don't know	30(23.2%)
5	Awareness of deterministic and stochastic effects	Yes	83(64.3%)
		No	15(11.6%)
		I don't know	29(22.5%)
6	Awareness of ALARA or ALADA principle	Yes	27(21%)
		NO	48(37.2%)
		I don't know	51(39.5%)
7	Dose digital radiography required less exposure than conventional x ray	yes	77(59.6%)
		No	15(11.6%)
		I don't know	35(27.1%)
8	High speed film is required a reduce exposure	Yes	38(29.4%)
		No	62(48%)
		I don't know	62(48%)
9	Radiography is absolutely contraindicated in pregnant women	Yes	69(53.5%)
		No	55(42.6%)
		I don't know	2(1.5%)
10	the exact distance an operator stand while taking X ray	Yes	80(62%)
		No	19(14.7%)
		I don't know	28(21.7%)

Table 3 shows the attitude of the students towards radiation protection practice. The majority of the students agree with adhering to the radiation protection protocol in the future (94.5%). While the operator item had the amount of (55.85%) while asking the patient to hold the Film with their

hand during exposure item had the result of a good (41.8%). The use of a lead apron, had the amount of (46.5%) who agreed with the using of a lead apron on regular basis, which is a good procedure to undergo. However, there were students who did not prefer using any lead apron, as a percentage of (39.5%) of them was because of the unavailability of the lead apron being equal to the students who do not know.

**Table 3: Attitude of the Students Towards Radiation Protection**

No	Attitude Item	Response	N (%)
1	ask the patient to hold the Film with their hand during exposure	Yes	54(41.8%)
		No	44(34.1%)
		I Don't Know	28(21.7%)
2	Should personal monitoring badges be worn by the operator	Yes	72(55.8%)
		No	11(8.5%)
		I Don't Know	42(32.5%)
3	Adhering to the radiation Protection protocol in the future	Yes	122(94.5%)
		No	1(0.77%)
		I Don't Know	4(3.1%)
4	using lead aprons on a regular basis	Yes	60(46.5%)
		No	29(22.8%)
		don't know	38(29.4%)
5	If never use lead aprons why not	availability of apron	51(39.5%)
		Due to weight of the apron	5(3.8%)
		Common apron for all	3(2.3%)
		I follow only distance rule	30(23.2%)
		I Don't know	51(39.5%)

**Discussion:**

Several studies followed a certain routine to measure radiation exposure over the years. These studies have shown an increase in the occurrence of cancer, birth defects, and cataracts and even caused a shortening of life span <sup>[13]</sup>. It is essential to follow ALARA principle which states that one must achieve “As Low as Reasonably Achievable” during dentist routine work to reduce the radiation dose, by which the exposure to dental radiation should be minimized wherever achievable <sup>[14]</sup>.

It was shown that (66.6%) of the students were aware that X-Rays are harmful and this result is identical with the findings of Behal S. who came up with a result that (59.01%) of 3<sup>rd</sup> year students were aware that X-Rays are harmful and Prabhat, et al. percentage was (100%).

A classical question usually asked by patients and technicians on a daily basis, is whether X-Ray beams reflect from room walls or not <sup>[14]</sup>. The results of current studies have shown that (39.5%) of the students answered ‘No’ for the question (are X ray beams reflected from walls) which is in concordance with Arnout EA study which showed that (50%) of preclinical group 2<sup>nd</sup> / 3<sup>rd</sup> students answered ‘No’ as well. The result of the present study shows that awareness of the usefulness of collimators and filters in radiography was (55.8%) which is above the result of Behal’s study for undergraduate students that rated (39.34%) and below the result of Prabhat MP study for 3<sup>rd</sup> medical undergraduates which was rated at a percentage of (72.5%). In this study, the students were aware about NCRP and ICRP recommendations (46.5%) which is almost equivalent to the results of Basheer, et al. dental students with a percentage of (45.4%), but not very close to Arnoute EA results which was (21.4%). Certain negligence done by medical practitioners can lead to a prolonged radiation exposure, which are hazardous and harmful to people <sup>[17]</sup>.

In Sultan’s <sup>[14]</sup> study, (19.2%) of undergraduates were Aware of ALARA or ALADA principle. In concordance with this study, (21%) had answered ‘yes.’ An alleged overuse of CT scanning as well as an inappropriate selection of scanning methods was considered, all of which expose patients to needless radiation <sup>[18]</sup>. The result of the present study shows that students answer the question of (Does digital radiography require less exposure than conventional X-Ray?), to which (53.5%) was not coincide with Basheer’s study and his dental students which were (80.7%) of the students. This explains that dental students were more aware, because digital radiography is

part of their daily work. Arnout E.A's study revealed that (40.5%) of the preclinical group (2<sup>nd</sup>/3<sup>rd</sup> year students) answered 'yes' for the question (Does the high speed film require a reduced exposure?). The results did not coincide with the current study which had the result of (29.4%). This might be explained because of the advanced classrooms and devices of Arnout EA group. The results of Arnout EA study showed that among undergraduate dental students, (87.5%) of them considered X-Rays to be harmful. In our study, out of 293 dental students, 63.5% considered X-Rays to be harmful.

In Behal S. 's study, it was observed that (45.90%) of 3<sup>rd</sup> year students knew that X-Rays is absolutely contraindicated in pregnancy, which is, agree with the current study that resulted in a percentage of (53.5%). In Sultan R. study, (14.8%) of dental undergraduate students (the ideal distance an operator stand while taking X-Ray) tick the correct answer in comparison to (62%) of the students of the current study which indicate that the current study, students are more knowledgeable than Sultan R.'s group. In this study the attitude of the students towards radiation protection was between (41.8%-94.5%). (39.5%) do not use apron due to unavailability of apron, while the same rate does not know the reason.

## Conclusion

The results obtained through this study show a good level of awareness to the knowledge of the students towards radiation protection, except for Awareness of ALARA or ALADA principles that was of an amount of (21 %) of the students. This might be because first-year students only study general principles in X-Ray materials. Basic knowledge and education development and updating the first year curriculum is required (about ALARA or ALADA principles). Workshops and training programs will be of great benefit to update students' knowledge.

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