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The Familiarity of Medical Students at Clinical Years about the Influence of Ionizing Radiations Doses

Fayez Saud Alreshidi*

Department of Family Medicine, College of Medicine, University of Ha'il, Hail, Kingdom of Saudi Arabia

**Corresponding e-mail: hussaingad5@gmail.com*

ABSTRACT

Background: *Since the medical students at the clinical phases increasingly becoming more close to the patient's diagnosis and treatment is very important to be aware of radiation dose. Therefore, this study aimed to assess the familiarity of Medical students at clinical years about the influence of ionizing radiation doses.* ***Methodology:*** *In this cross-sectional study, 443 medical students at clinical phases of the study (4th, 5th, and 6th years) were randomly selected from three medical colleges in 3 universities (Hail, Jouf, and Tabuk). A purposeful questionnaire was designed and distributed electronically to collect the desired data.* ***Results:*** *Out of the 433 students, 339/433 (78.3%) knew that a person's body weight is an important determinant of radiation dose, whereas, the remaining 94/433 (21.7%) claimed that weight has no role. Correct radiation dose for Bone scan (>300 mSv), Spine MRI (0 mSv-1 mSv), Abdominal x-ray (10 mSv-50 mSv), Abdominal US (0 mSv-1 mSv), PET Scan (10 mSv-50 mSv), PET/CT scan (10 mSv-50 mSv), Mamo (2 views) (5 mSv-10 mSv), and Thyroid scan (10 mSv-50 mSv), constituting 16/433 (3.7%), 129/433 (29.8%), 49/433 (11.3%), 144/433 (33.3%), 48/433 (11%), 50/43 (11.5%), 115/433 (26.6%), and 55/433 (12.7%), in that order.* ***Conclusion:*** *Medical students in the late clinical years have inadequate knowledge of ionizing radiation doses in Northern Saudi Arabia Medicine College, which necessitates further interventions in this context, at the level of general curriculum as well as, at the training in the late clinical years*

Keywords: Radiations doses, Medical students, Hail, Saudi Arabia

INTRODUCTION

It is well known that exposure to ionizing radiation has several health consequences to human health. The serious risks of radiation exposure necessitate the development of protective measures and guidelines both for the patients and health practitioners. Many factors have been nominated to contribute to the overall radiation exposure health impact including sex, age, genetic susceptibility, lifestyle factors affecting the radio-sensitivity, and comorbidity [1].

As the effects of occupational exposure have become increasingly sophisticated it is used for setting radiation protection. It is recognized with high assurance that radiation exposure special effects at levels over 100 mGy-150 mGy can be identified and proved in numerous population studies piloted worldwide. However, the difficulty usually associated with the evaluation of low doses, under 100 mGy of low-linear energy transfer radiation [2]. Normal tissues can recover from damaged caused by radiation overexposure, though the risk of damage might have an impact on the quality of life in some organs [3].

Raising the awareness of radiation concerned the medical team about the long-term risk associated with ration exposure is very important. Such an approach can improve the knowledge, avoidance of unnecessary doses, and improve the overall clinical practice [4]. Consequently, this study aimed to assess the familiarity of Medical students at clinical years about the influence of ionizing rations doses.

MATERIALS AND METHODS

In this cross-sectional study, 443 medical students at clinical phases of the study (4th, 5th, and 6th years) were ran-

domly selected from three medical colleges in 3 universities (Hail, Jouf, and Tabuk). A purposeful questionnaire was designed and distributed electronically to collect the desired data. Besides demographical data the questionnaire included questions such as: Is weight important parameters that affect patients radiation dose?, (If it is not known to you, the dose of radiation is measured in SI units and is called Sieverts (Sv): How much radiation is a person exposed to from natural background in (mSv) every year? A plain chest x-ray is considered 1 unit, for each of the following radiological investigations, how many 'units' would a patient absorb: chest x-ray equivalents? Head CT (50 mSv-300 mSv). Spiral CT of abdomen (>300 mSv, Bone scan (>300 mSv), Spine MRI (0 mSv-1 mSv), Abdominal x-ray (10 mSv-50 mSv), Abdominal US (0 mSv-1 mSv), PET Scan (10 mSv-50 mSv), PET/CT scan (10 mSv-50 mSv), Mamo (2 views) (5 mSv-10 mSv), and Thyroid scan (10 mSv-50 mSv).

Data Analysis

Statistical analysis was performed using SPSS V22.0 SPSS. Frequencies and percentages and cross-tabulation of variables were obtained.

RESULTS

Out of 433 students, 228/433 (52.7%) were males and 205 (47.3%) were females. The majority of the students were aged 23-24 years, followed by 21-22, and 25-26 years, representing 220 (50.8%), 163 (37.6%), and 45 (10.4%), respectively, as indicated in Table 1 and Figure 1.

Most of the students were in 4th year followed by 5th and 6th year representing 158/433 (36.5%), 140/43 (32.3%), and 135/433 (31.2%), respectively. The majority of the students were from the University of Tabuk followed by the University of Hail, and the University of AlJouf, constituting 182 (42%), 142 (32.8%), and 109 (25.2%), in this order.

Table 1 Distribution of the students by gender and age, study year, and university

Category	Variable	Males	Females	Total
Age	21-22 years	93	70	163
	23-24 years	105	115	220
	25-26 years	25	20	45
	27+ years	5	0	5
	Total	228	205	433
Study Year	4th year	91	67	158
	5th year	73	67	140
	6th year	64	71	135
	Total	228	205	433
University	Hail	54	88	142
	AlJouf	61	48	109
	Tabuk	113	69	182
	Total	228	205	433

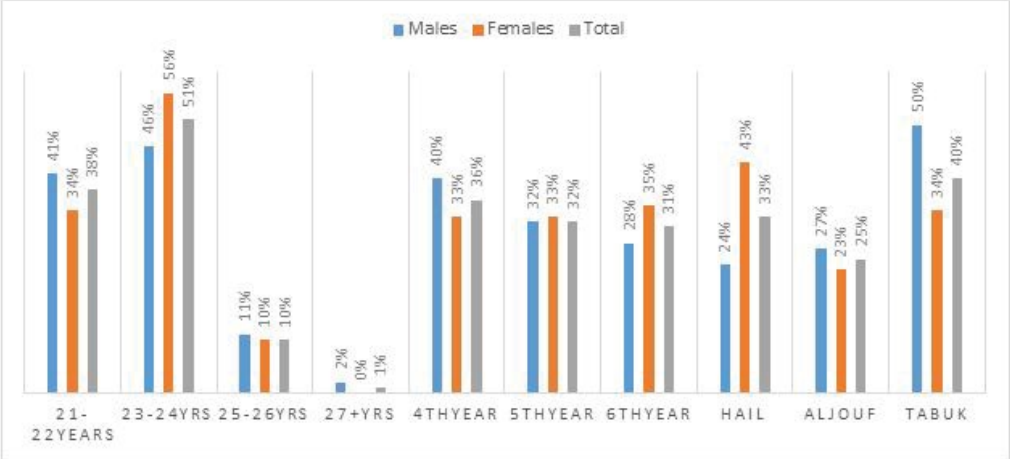

Figure 1 Description of the students by gender and age, study year, and university

Out of the 433 students, 339/433 (78.3%) knew that a person's body weight is an important determinant of radiation dose, whereas, the remaining 94/433 (21.7%) claimed that weight has no role. The numbers of the students answered "Yes" were relatively similar in all levels. Radiation exposure from a natural background in (mSv)/year was indicated in Table 2.

Table 2 Students by knowledge of radiation dose background

Category	Variable	4th Year (N=158)	5th Year (N=140)	6th Year (N=135)	Total (N=433)
Weight is an important determinant of radiation dose	Yes	111	115	113	339
	No	47	25	22	94
Radiation exposure from a natural background in (mSv)/year	1-1.5	45	44	45	134
	2-2.4	84	71	65	220
	4-24	26	21	21	68
	240	3	4	4	11

Table 3 and Figure 2 summarized the distribution of the students by the clinical year of study (level) and Knowledge of correct radiation dose for different parts of the body. The correct radiation dose for Chest X-ray (1 mSv-5 mSv) was stated by 146/433 (33.7%) of the students. Out of the 146 students, 47/158 (29.7%), 69/140 (49.3%), and 30/135 (22.2%) were at 4th, 5th, and 6th years, respectively.

The correct radiation dose for Head CT (50 mSv-300 mSv) was stated by 36/433 (8.3%) of the students. Out of the 36 students, 9/158 (5.7%), 15/140 (10.7%), and 12/135 (8.9%) were at 4th, 5th, and 6th years, respectively.

The correct radiation dose for Spiral CT of the abdomen (>300 mSv) was stated by 22/433 (5%) of the students. Out of the 22 students, 7/158 (4.4%), 6/140 (4.3%), and 9/135 (6.7%) were at 4th, 5th, and 6th years, respectively.

Correct radiation dose for Bone scan (>300 mSv), Spine MRI (0 mSv-1 mSv), Abdominal x-ray (10 mSv-50 mSv), Abdominal US (0 mSv-1 mSv), PET Scan (10 mSv-50 mSv), PET/CT scan(10 mSv-50mSv), Mamo (2 views) (5 mSv-10 mSv), and Thyroid scan (10 mSv-50 mSv), constituting 16/433 (3.7%), 129/433 (29.8%), 49/433 (11.3%), 144/433 (33.3%), 48/433 (11%), 50/43 (11.5%), 115/433 (26.6%), and 55/433 (12.7%), in that order.

Table 3 Distribution of the students by the clinical year of study (level) and Knowledge of correct radiation dose for different parts of the body

Category	Variable	4th Year (N=158)	5th Year (N=140)	6th Year (N=135)	Total (N=433)
Chest X-ray (1 mSv-5 mSv)	Correct dose	47	69	30	146
	Incorrect dose	111	71	105	287
Head CT (50 mSv-300 mSv)	Correct dose	9	15	12	36
	Incorrect dose	149	125	123	397
Spiral CT of the abdomen (>300 mSv)	Correct dose	7	6	9	22
	Incorrect dose	151	134	126	411
Bone scan (>300 mSv)	Correct dose	4	8	4	16
	Incorrect dose	154	132	131	417
Spine MRI (0 mSv-1 mSv)	Correct dose	38	54	37	129
	Incorrect dose	120	86	98	304
Abdominal x-ray (10 mSv-50 mSv)	Correct dose	22	10	17	49
	Incorrect dose	136	130	118	384
Abdominal US (0 mSv-1 mSv)	Correct dose	44	57	43	144
	Incorrect dose	114	83	92	289
PET Scan (10 mSv-50 mSv)	Correct dose	18	16	14	48
	Incorrect dose	140	124	121	385
PET/CT scan (10 mSv-50 mSv)	Correct dose	18	17	15	50
	Incorrect dose	140	123	120	383
Mamo (2 views) (5 mSv-10 mSv)	Correct dose	42	36	37	115
	Incorrect dose	116	104	98	318
Thyroid scan (10 mSv-50 mSv)	Correct dose	26	10	19	55
	Incorrect dose	132	130	116	378

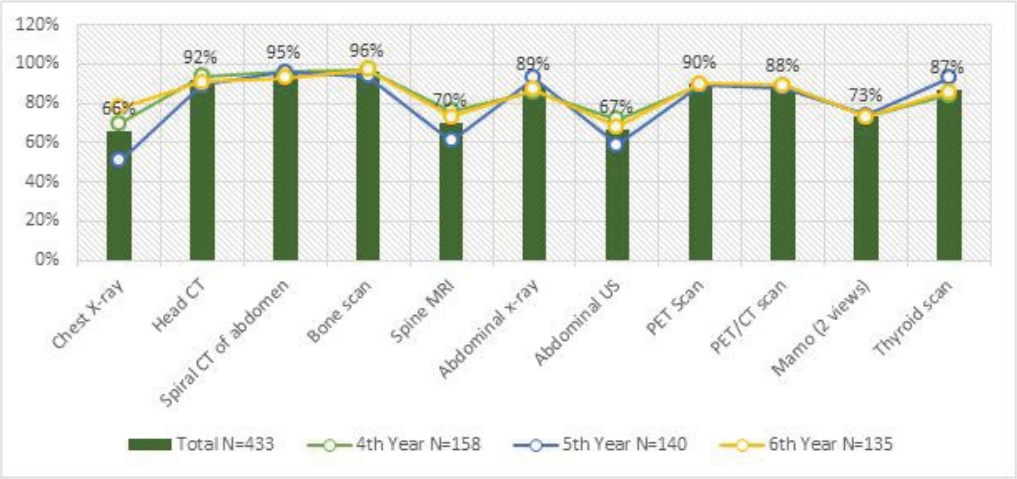

Figure 2 Students by interpretation of incorrect radiation dose

Out of 339/433 (78.3%) knew that a person's body weight is an important determinant of radiation dose, 153/182 (84%), 107/142 (75%), and 79/109 (72%) were from medical college of Tabuk, Hail, and Jouf, respectively. Radiation exposure from a natural background in (mSv)/year was indicated in Table 4.

Table 4 Students by knowledge of radiation dose background and University

Category	Variable	Hail (N=142)	Jouf (N=109)	Tabuk (N=182)	Total (N=433)
Weight is an important determinant of radiation dose	Yes	107	79	153	339
	No	35	30	29	94
Radiation exposure from a natural background in (mSv)/year	1-1.5	38	31	65	134
	2-2.4	86	57	77	220
	4-24	15	20	33	68
	240	3	1	7	11

Table 5 and Figure 3 summarized the distribution of the students by the university and Knowledge of correct radiation dose for different parts of the body. For Chest X-ray, the highest correct dose interpretation was achieved by Hail 61/142 (43%). For Head CT, the highest correct dose interpretation was achieved by Hail 24/142 (17%). For Spiral CT of the abdomen, the highest correct dose interpretation was achieved by Hail 13/142 (9%). For the Bone scan, the highest correct dose interpretation was achieved by Hail 9/142 (6%). For Spine MRI, the highest correct dose interpretation was achieved by Hail 57/142 (40%). For Abdominal x-ray, the highest correct dose interpretation was achieved by Tabuk 50/182 (27.5%). For the Abdominal US, the highest correct dose interpretation was achieved by Hail 71/142 (51%). For PET scan, the highest correct dose interpretation was achieved by Tabuk 21/182 (11.5%). For PET/CT scan, the highest correct dose interpretation was achieved by Tabuk 20/182 (11%). For Mamo (2 views), the highest correct dose interpretation was achieved by Tabuk 45/182 (25%). For a Thyroid scan, the highest correct dose interpretation was achieved by Tabuk 20/182 (11%).

Table 5 Distribution of the students by the university and Knowledge of correct radiation dose for different parts of the body

Category	Variable	Hail (N=142)	Jouf (N=109)	Tabuk (N=182)	Total (N=433)
Chest X-ray (1 mSv-5 mSv)	Correct dose	61	25	60	146
	Incorrect dose	81	84	122	287
Head CT (50-300 mSv)	Correct dose	24	6	6	36
	Incorrect dose	118	103	176	397
Spiral CT of the abdomen (>300 mSv)	Correct dose	13	7	2	22
	Incorrect dose	129	102	180	411
Bone scan (>300 mSv)	Correct dose	9	2	5	16
	Incorrect dose	133	107	177	117
Spine MRI (0 mSv-1 mSv)	Correct dose	57	26	46	129
	Incorrect dose	85	83	136	304
Abdominal x-ray (10 mSv-50 mSv)	Correct dose	30	31	50	111
	Incorrect dose	112	78	132	322
Abdominal US (0 mSv-1 mSv)	Correct dose	71	30	43	144
	Incorrect dose	71	79	66	289
PET Scan (10 mSv-50 mSv)	Correct dose	13	14	21	48
	Incorrect dose	129	95	161	385
PET/CT scan (10 mSv-50 mSv)	Correct dose	19	11	20	50
	Incorrect dose	121	98	162	383
Mamo (2 views) (5 mSv-10 mSv)	Correct dose	37	33	45	115
	Incorrect dose	105	76	137	318
Thyroid scan (10 mSv-50 mSv)	Correct dose	18	17	20	55
	Incorrect dose	124	92	162	378

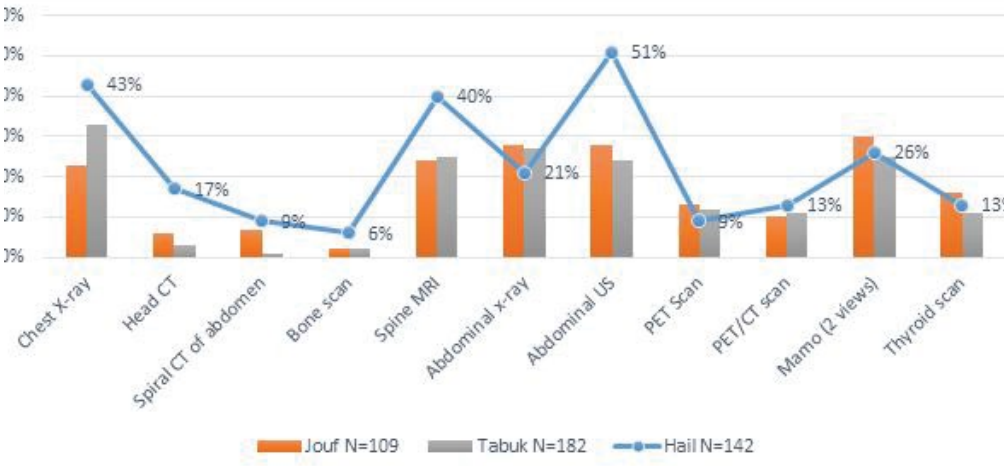

Figure 3 Interpretation of the correct radiation dose by the students of the three Medicine colleges

DISCUSSION

As the medical students at the clinical phases increasingly becoming closer to patients' diagnosis and treatment, the present study aimed to assess the familiarity of Medical students at clinical years about the influence of ionizing radiation doses. The overall awareness of medical students towards the correct dose released by different radiation methods and for different body organs is very poor among these studied sections of medical students.

It was reported that 20-50% of radiological imaging investigation are well-thought-out and inappropriately requested [5]. It was reported that many health care professionals have low knowledge of ionizing radiation and the observed dose in the exposed patients. Many of these health practitioners were not aware of radiation risks and the most significant parts of radiation protection; though, they have handed some courses in radiobiology and medical physics [6].

A similar study from Norway to evaluate the awareness level of radiation dose among medical students in their final year, found that the overall medical students' knowledge of radiation dose associated with medical investigations were very low [7]. In a study to determine and design a national parameter of knowledge related to radiation doses and its resultant various influences among medical students in Saudi Arabia, reported that health's caregivers have a lack of knowledge of radiation doses, as well as, the risk associated with medical imaging investigations [8]. In a study from Saudi Arabia, knowledge regarding ionizing radiation and radiation protection was found to be very low among medical students, but after delivering a lecture about the topic, a high awareness was confidently utilized by the students [9].

A recent study conducted at the College of Medicine, University of Hail to assess awareness and knowledge of radiation exposure risks among medical students found that the medical students at the University of Hail have very inadequate information of radiation exposure risks and safety dealings [10], which might be consistent with the findings of the present study. However, the findings of the present didn't show any considered variation among the three investigated students' levels.

The present study also showed great variations among the three medical students, Hail medical college as leading towards a better understanding of radiation doses. Such variations might be determined by the influence of the curriculum in clinical radiology in each medical college. Increasing early knowledge of the medical students on radiation exposure in diagnostic acumens may improve the performance of late year's students regarding radiation dose and exposure [11].

CONCLUSION

Medical students in the late clinical years have inadequate knowledge of ionizing radiation doses in Northern Saudi Arabia Medicine College, which necessitates further interventions in this context, at the level of general curriculum as well as, at the training in the late clinical years.

DECLARATIONS

Conflicts of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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