Knowledge Attitude and Practice of Radiology among Final Year Medical Students

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***Abstract*- INTRODUCTION**

Moreover, for developing knowledge among students about radiation hazards and prevention, an effective medical education model would be helpful to disseminate information to those who have limited knowledge about radiology and radio-diagnostics.

METHODS

The study was a prospective analysis of the knowledge, attitude and practice of radiology among final year medical students of faculty of medicine, University of Jos, Plateau State in 2014.

The data obtained from the structured questionnaire was entered into a computer to generate a computerized data base for subsequent analysis and processing using SPSS version 20. Statistical parameters were used for association between different variables. P value of <0.05 was considered statistically significant. The results were presented in the form of tables, graphs and charts.

RESULTS

The sex distribution showed that males were 82 and females were 42. A lot of the students liked radiology as a specialty in medicine (101) and 19 students did not. The knowledge of radiology among the students were not good.

Males are seen to have more interest in radiology as a subject (75) than females that had 26 students. Overall, 75 (92.6%) of males have interest in radiology compared to those that don't have interest in radiology 6(7.4%). The result is statistically significant with a p=0.001. 26 (66.7%) of the females are interested in radiology compared to 13(33.3%) that are not interested in radiology. It is only 27(21.8%) students indicated their interest in specializing in radiology.35(28.2%) students believed that radiological practice are hazardous and 34(27.4%) of the students believed that there are adequate means in place to prevent much hazard with practice of radiology.

CONCLUSION

The students believed in the relevance of radiology in the medical school curriculum and its importance to future medical practice. There was no good knowledge of radiology among the student.

***Index Terms*-** Knowledge, attitude, practice, final year, medical students

I. INTRODUCTION

On November 8, 1895, German physics professor Wilhelm Conrad Rontgen discovered the X-ray and noted that, while it could pass through human tissue, it could not pass through bone or metal.[1] Röntgen referred to the radiation as "X", to indicate that it was an unknown type of radiation. He received the first Nobel Prize in Physics for his discovery.[2] Medical imaging using ionizing radiation is an accepted and fundamental part of medical practice, it is an essential tool for diagnosis however, and ionizing radiation has been shown to have adverse biological effects on living organisms. While there is controversy over the extent of cancer risk associated with exposures to radiation from medical imaging, there is broad agreement that steps can and should be taken to reduce unnecessary radiation exposure.[3] The risk of adverse sequelae following medical radiation exposure increases with higher doses of radiation. It is the duty of the requesting doctor to balance the risks and benefits of imaging tests, particularly those that involve the use of ionizing radiation. In order to do this optimally, the doctor requires the knowledge of the radiation dose the patient receives from the radiological examination being ordered for and the attendant risk.[3]

The curriculum for a medical student involves teaching various subjects that aims specifically at the application of knowledge and problem solving skills during in a pre-assigned academic period. In Pakistan, medical students underwent their clinical rotation in the department of radiology either in the fourth or in the final year of undergraduate training programme. Within the curriculum, the Pakistan Medical and Dental Council has combined six subjects that includes radiology and has allocated a total of 40 hours in five years.[4] Medical students acquire knowledge about the fundamentals of radiology and the interpretation of clinical radio-diagnostics during their rotation in the radiology department. If medical students are not empowered with sufficient and precise knowledge regarding different aspects of radiation, it would be difficult to communicate correct information to the potential radiation recipient.[5]

Moreover, for developing knowledge among students about radiation hazards and prevention, an effective medical education model would be helpful to disseminate information to those who have limited knowledge about radiology and radio-diagnostics.[6] Thirty-eight million radiological or radio-diagnostic tests were undertaken in England between August2010 and August 2011.[7] A systematic review of studies based in secondary care reports that the risk is rarely discussed with patients undergoing radiological investigations and only a minority of hospital, doctors are well informed about the dose and risk associated with common radiological procedures. There is little available evidence on the knowledge, attitudes and practice of radiological risk in a primary care setting.[7]

The IAEA suggests that when referring for radiological investigations the referring doctor uses caution to ensure that the

investigation is substantially beneficial and that risk is kept to a minimum.[8] To do this the IAEA defines a three-stage justification process. Stage one refers to a general acknowledgement that medical radiation in general does more good than harm. The second stage refers to the correct investigation being requested. A knowledge of which investigation is needed in which situation is required by the referring practitioner, and is the focus of guidelines produced by professional bodies. The third stage refers to the application of this investigation to this particular patient. In stage three of this justification process, it could be viewed that it is the responsibility of the referring practitioner to discuss and communicate risks to the patient.

Current research therefore suggests that only a minority of hospital doctors are well informed about the radiation dose and risks associated with common radiological procedures. Little is known about the situation in primary care. Increasing access to radiology in primary care, a specialty which places emphasis on risk communication and shared decision making, means this is an area of clinical and training significance.[7]

The objective of this study was to explore the knowledge, attitudes and practice of radiology amongst final year medical students.

II. METHODS

The study was a prospective analysis of the knowledge, attitude and practice of radiology among final year medical students of faculty of medicine, University of Jos, Plateau State in 2014. Information sought from the structured questionnaires included age, sex, if they have done the posting,of the knowledge of types of imaging modalities, knowledge of ionizing and non-ionizing radiation imaging modalities, interest in radiology as a subject and interest in specializing in radiology, knowledge of hazards and ways of reducing it. The association between sex and age with respect to interest in radiology.

III. DATA ANALYSIS

The data obtained from the structured questionnaire was entered into a computer to generate a computerized database for subsequent analysis and processing using SPSS version 20.

Statistical parameters such as chi square, student's T-test etc, were used for association between different variables. P value of <0.05 was considered statistically significant. The results were presented in the form of tables, graphs and charts.

Exploratory data analysis tools like charts and descriptive statistics (mean, SD, range) were used to examine the distribution. Age group in years was broken down into five(5) groups: (20-24), (25-29), (30-34), (35-39) and (40-44).

Ethical clearance was obtained for the study from the relevant authority.

IV. RESULTS

The minimum age is 20 years and the maximum age was 42years. The mean age was 26.48±2.88 years.

The majority of the students are in the age group of 25-29 years. The age groups of 35-39 and 40-44 have the least students (Table 1).

The sex distribution showed that males were 82 and females were 42. The males were about twice the numbers of female students (Figure 1I).

Majority of the students had done radiology posting (123) and only one student did not do the posting (Table 2).

A lot of the students liked radiology as a specialty in medicine (101) and 19 students did not. However, 4 students were undecided. Males are seen to have more interest in radiology as a subject (75) than females that had 26 students. Overall, 75(92.6%) of males have interest in radiology compared to those that don't have interest in radiology 6(7.4%). The result is statistically significant with a p=0.001. 26(66.7%) of the females are interested in radiology compared to 13(33.3%) that are not interested in radiology (Table 3).

60 students had correct knowledge of radiology, while 61 students had incorrect knowledge of radiology. There was however no respond from 3 students. This showed that the students did not have a good knowledge of radiology. Table 7

The knowledge of the imaging modalities in radiology showed that only 14 students listed 6 imaging modalities, with majority 46(37.1%) listing 4 imaging modalities. The lowest frequencies were those that listed one or two imaging modalities. One student however did not respond. The knowledge of imaging modalities was very poor among the students. Table 5

The knowledge of the list imaging modalities that are involved with ionizing radiation showed that only 8 students list 4 imaging modalities (6.5%). 51(41.1%) students mentioned only two imaging modalities. 14(11.3%) students did not respond to the question. Table 6

It is only 27(21.8%) students indicated their interest in specializing in radiology, whereas 89(71.8%) of the students had no interest in specializing in radiology. 7 students were undecided and one student did not respond. Table 8

The reasons given for those that have interest in radiology were many but the majority believes it is an interesting field that is important in management of patients. The least reasons are that the lecturers carried them along and monetary value.

Those that said no to specializing in radiology gave various reasons; with most of them saying that they want to specialize in another field 38(30.6%). The least response in this group are those that radiology is too demanding. The majority in this group also did not respond 45(36.3%). Table 8

The majority of the students 59(47.6%) said that the teaching mode was not adequate while 41(23.1%) believed that the teaching was adequate. 66(53.2%) students believed that the period for radiology posting was not adequate and 51(41.1%) of the students said that the period was adequate. 46(37.1%) of the students said that the numbers of radiologist were not adequate and 44(35.5%) believed that the number of radiologist are adequate. Table 9 35(28.2%) students believed that radiological practice are hazardous and 34(27.4%) of the students believed that there are adequate means in place to prevent much hazard with practice of radiology. Some students believe that no adequate allowance for the risk of radiation and no technical know how in practice of radiology. Table 10

V. DISCUSSION

There are a total of 124 students in the final year class. It comprises of 82 males and 42 females. There are more males in the class than females and the ratio is almost 2:1. Other researchers observations were different. Potterton *et al*[9] noted that females were approaching 50%. *Vital et al*[12] recorded a total of 108 students, with 70% being females. The male to female ratio may be due to the facts that more males prefer to read medicine that is seen to be a difficult aspect of sciences and time consuming in our environment.

The minimum age of 20 and maximum age of 42 years, with a mean age of 26.48±2.88 years was noted. The majority of the students are in the age group of 25-29 years. This is so because of the eligibility age of entering the university and the attendant frequent disruption of the school calendar because of students unrest and staff strikes.

Radiology posting is done during special posting involving Radiology, Psychiatry, ENT, Ophthalmology and Anesthesia. This is similar to what is done in Pakistan.[4] The students have intensive lectures for the five months of the posting. Each group came to the department for one month clinical rotations in which they are divided into different groups covering the different imaging modalities.

About 101 of the students like radiology as a specialty in the field of medicine.The male students actually had more interest in the field of radiology. Over 90% of the males had interest in radiology as against 66% among the females students. While the number of women entering medical schools is approaching 50% nationally, women continue to be underrepresented in a number of specialties including diagnostic radiology. While diagnostic radiology has many characteristics that might be desirable to women, such as reasonable call hours, flexible scheduling, and high salaries, women still do not choose diagnostic radiology as a career. The current literature suggests a constellation of factors may be responsible for the gender differences in diagnostic radiology. We suggest that further research is needed to elucidate why women do not seem to be choosing diagnostic radiology as frequently as one might predict based on the lifestyle of diagnostic radiologists and the numbers of women currently entering medical school.[9]

The knowledge of what is radiology was asked, in which we discovered that less than half of the class had a good knowledge. 60 students had correct knowledge of radiology. It is one of the responsibilities of a health care professional to provide first hand knowledge to the patients undergoing all radiological procedures and processes. The physician can answer to queries of a common-man regarding radiation hazards, which can be reliable provided their knowledge is adequate and up-to date. The knowledge related to radiation is taught during undergraduate training in medical colleges. However, physicians grossly underestimated the proper risk regarding proper use of medical imaging tools and their associated radiationrisks.[10,11]

They were thought in class that there are six imaging modalities,which comprises computed tomography, magnetic resonance imaging, ultrasound, conventional x-ray, fluoroscopy and nuclear medicine. It was only 14(11.3%) students that could list all the imaging modalities. The result was very poor. The highest response listed 4 imaging modalities. A few of the students listed one or two imaging modalities.

27(21.8%) students indicated interest in specializing in radiology and over 70% are not interested in specializing in radiology. Those that showed interest in radiology made us to realize that they feel that it is an important field of medicine that is pivotal for management of patients. This is similar to what was noted by Adeyekun.[13]However, some of the students were thrilled by the radiology lecturers and also because of the economic gains and therefore will want to specialize in radiology.Majority of the students that didn't want to specialize in radiology had made up their mind up in specializing in other fields of medicine.The other reasons included; it is too demanding and fear of ionizing radiation.Our finding was similar to that of vidal *et al*[12] that found fifty-two percent of students had a clear idea of their professional future prior to the rotation. Five students (4.7%) believed prior to the rotation that it might have an impact on their professional future, versus 63% after the rotation ($P<0.0001$). The students whose parents work in the medical or paramedical field do not have a better defined idea of their professional future; on the other hand, they have more interest for radiology (73.6% with high or very high interest versus 52.8%, $P=0.03$). After the rotation, there was a significant increase in the number of students with high or very high interest for radiology (77.8% versus 66.7%, $P=0.023$). A student noted that he would redirect his career to radiology.

The students had lectures in the class, while during the posting, they had tutorials as they all pass through the different imaging modalities. We found out that the teaching mode was not adequate based on their responses. 59 students (47.6%) said that the teaching was not adequate and they are about twice the numbers that said the teaching was adequate.

There was complaint on the duration of the radiology posting. It was said to be too short as found in our study in which 66 students (53.2%), stated that the period was not adequate. They constituted about half the number in the class. 51 students felt that the period of radiology posting was adequate. Our finding was at variance with what was found by vidal *et al*[12] in which eighty-eight percent of students were satisfied or very satisfied with the radiology rotation. Overall, the students believe that 70% of the objectives were achieved. The only criticism from the students was that the clinical instructors were overworked. We are contemplating making a case for the increase of the period for radiology posting to give the students ample time to understand the specialty better.

The number of consultant radiologist in the department when this data was taken were five. The response from the students was that the number of consultants were not adequate. This is similar to what was observed by Vidal *et al.*[12] 46(37.1%) students believed that there is need for more radiologists in the department. This calls for more doctors specializing in radiology and the radiologists sub-specializing to cover the different aspect of radiology. 44(35.5%) are of the opinion that the number of radiologists are adequate.

Knowledge on hazards associated with radiological practice in clinical setting revealed a lot. 35(28.2%) students stated that the practice of radiology is hazardous. They were concerned about radiations which may be associated with cancer later in life and congenital malformations in children if their pregnant mothers were exposed to radiation in the course of doing there work in the department. 34(27.4%) of the students stated that

there are adequate protective measures in the department. Knowing fully that the walls are lead lined, personal radiation monitoring badges that monitored online and radiation survey meter that measures radiations in the department. Even among medical students, a survey showed an acceptable level of awareness of radiation protection.[14] Furthermore, there is no health risk to medical or emergency personnel treating patients exposed to high levels of radiation, subjected to proper universal precautions.[14]

Some students are of the opinion that there should be allowances paid to the personnel in the radiology department as a means encouraging them. That this will encourage more people to take to the field of radiology. Some of the students stated that there are no technical know how in practice of radiology in our environment. That there is need for more training and acquisition of more advance machines in the industry. There observations were important and it is what we are hoping that the hospital will look into in making the practice of radiology to be world class in our environment.

Early exposure of medical students to radiology increases their level of interest for the specialty and increases the perception of differences between a hospital-based practice and private practice. The overall knowledge of students about radiology was improved, but the workload of clinical instructors impaired the quality of the rotation.[14]

Adeyekun[13] observed that the students believed in the relevance of radiology in the medical school curriculum and its importance to future medical practice. There was acceptable level of awareness of radiation protection. However, the rotation failed to change the misconception of Radiologist's enormous workload with resultant bias to the specialty. It is concluded that the rotation had a mixed effect on student's knowledge and perception of radiology. This finding is comparable with other studies done in industrialized countries as noted in our study. Measures aimed at improving the unfavorable attitudes are suggested.

In conclusion, there is still a long way to go in the field of radiology in our setting. The teaching has to improve so that students will appreciate the importance of radiology in the holistic management of patients. The risk of practice of radiology is reduced to the barest minimum because of the radiation protective measures in place in the radiology departments.

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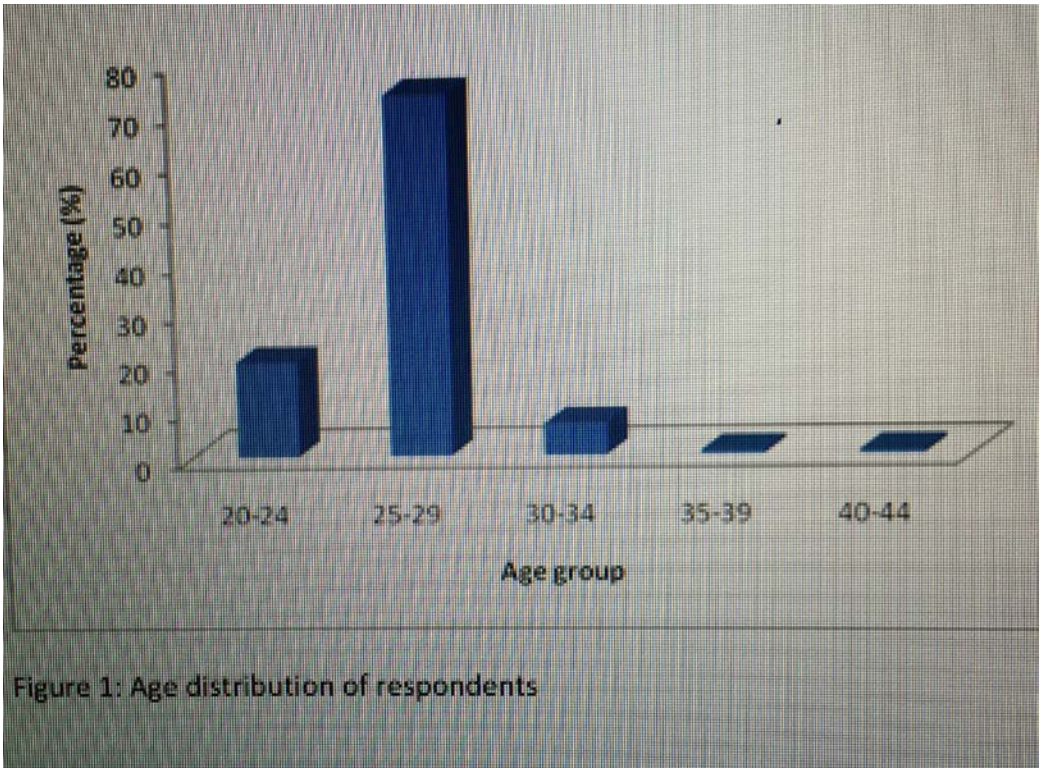

Figure 1: Age distribution of respondents

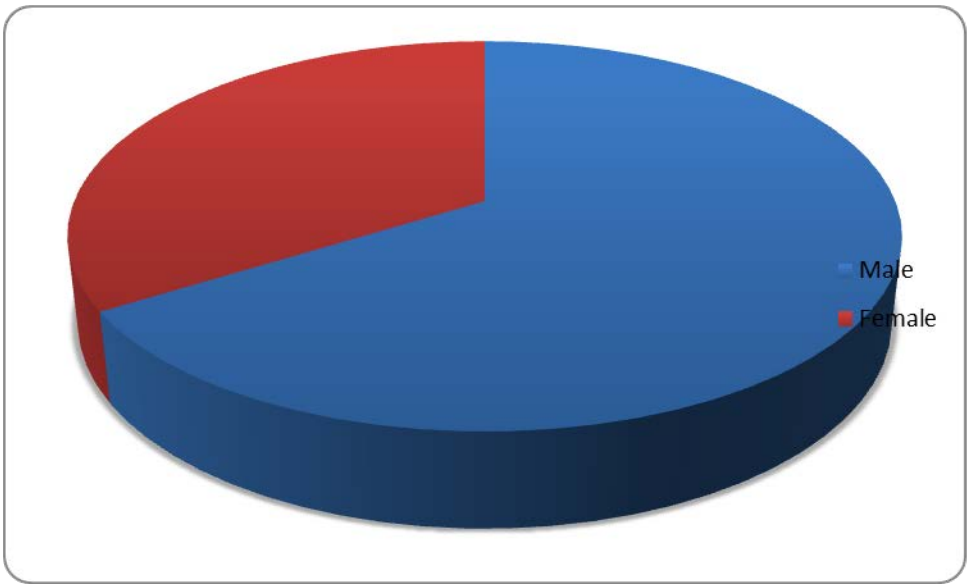

Figure II: Sex distribution of respondents.

Table 1: Demographic variables of the respondents

Variables	Frequency	Frequency
Age group		
20-24	24	19.4
25-29	90	72.6
30-34	8	6.5
35-39	1	0.8
40-44	1	0.8
Total	124	100.0
Age		
Min. Age	20	
Max. Age	24	
Mean Age	26.48±2.88	
Sex		
Male	82	66.1
Female	42	33.9
Total	124	100.0

Table 2: Percentage distribution of respondents according to gender

Variables	Frequency	Percentage (%)
Have you done radiology posting		
Yes	123	99.2
No	1	0.8
Do you like radiology as a speciality in medicine?		
Yes	101	81.5
No	19	15.3
Undecided	4	3.2
What is radiology?		
Correction knowledge	60	48.4
Incorrect knowledge	61	49.2
No response	3	2.4

Table 3: Association between gender and interest in radiology.

Gender	Do you like radiology as a speciality in medicine?		χ^2	P
	Yes	No		
Male	75(92.6)	6(7.4)	13.278	0.001
Female	26(66.7)	13(33.3)		
Total	101(84.2)	19(15.8)		

Table 4: What is your impression about radiology.

Responses	Frequency	Percentage (%)
Useful in diagnosis	15	12.1
Very broad in nature	45	36.3
Satisfactory	19	15.3
Important in patients management	17	13.7
It is an advanced clinical anatomy	6	4.8
I am indifferent	1	0.8
Teaching not adequate	1	0.8
No response	20	16.1

Table 5: Various imaging modalities in radiology

Imaging modalities	Frequency	Percentage (%)
Mentioned 1 imaging modalities	3	2.4
Mentioned 2 imaging modalities	3	2.4
Mentioned 3 imaging modalities	16	12.9
Mentioned 4 imaging modalities	46	37.1
Mentioned 5 imaging modalities	41	33.1
Mentioned 6 imaging modalities	14	11.3
No response	1	0.8

Table 6: Ionizing imaging modalities in radiology

Imaging modalities	Frequency	Percentage (%)
Mentioned 1 imaging modalities	23	18.5
Mentioned 2 imaging modalities	51	41.1
Mentioned 3 imaging modalities	28	22.6
Mentioned 4 imaging modalities	8	6.5
No response	14	11.3

Table7: knowledge of radiology and radiology posting.

Variables	Frequency	Percentage (%)
Have you done radiology posting		
Yes	123	99.2
No	1	0.8
What is radiology?		
Correct knowledge	60	48.4
Incorrect knowledge	61	49.2
No response	3	2.4

Table 8: Are you interested in specializing in radiology

Variables	Frequency	Percentage (%)
Are you interested in specializing in radiology?		
Yes		
No	27	21.8
Undecided	89	71.8
No response	7	5.6
	1	0.8
If yes, why?		
It is encompassing	6	4.8

Important in patients managemant	16	12.9
Monetary gains	1	0.8
It is less time consuming in practice	2	1.6
Lecturers carry students along.	1	0.8
No response	98	79.0
If no, why?		
I am specializing in another fields	38	30.6
Inadequate and expensiveimaging modalities	6	4.8
Abstract in nature	17	13.7
Too demanding	2	1.6
Because of the hazards involved	3	2.4
Lack of interest in radiology	13	10.5
No response	45	36.3

Table 9: Teaching mode and duration of radiology posting

Variables	Frequency	Percentage (%)
Is the teaching mode adequate?		
Yes	41	23.1
No	59	47.6
Don't know	23	18.5
No response	1	0.8
Is the period for radiology posting adequate?		
Yes	51	41.1
No	66	53.2
Don't know	6	4.8
No response	1	0.8
Is the number of radiologist adequate?		
Yes	44	35.5
No	46	37.1
Don't know	33	26.6
No response	1	0.8

Table 10: What is your perception of the hazards associated with radiological practice in clinical setting

Responses	Frequency	Percentage (%)
Ionizing radiation exposure	34	27.4
Hazards associated with radiation	35	28.2
Cancers from radiations	18	14.5
Radiologists are exposed to radiations	3	2.4
No adequate hazard allowance	1	0.8
No technical know how	1	0.8
No response	32	25.8