



## A QUESTION BASED STUDY ON RADIATION EXPOSURE ASSOCIATED WITH DIAGNOSTIC IMAGING INVESTIGATIONS IN UNDERGRADUATE MEDICAL STUDENTS

### Radiodiagnosis

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### ABSTRACT

**Background:** The present study planned and conducted to evaluate the awareness of radiation exposure associated with diagnostic imaging investigations in the medical students.

**Materials and Methods:** This study was conducted in the period of 2017 for 2 months. A total of 60 medical students were included in the study. A questionnaire prepared with 14 questions. This question paper was given to each student. After that the answer sheets was collected and analyzed. The data was expressed in number and percentage.

**Results:** All the subjects answered yes to the question whether awareness regarding radiation in radiology important. More number of subjects not aware of indications of radiological investigation modalities for different clinical conditions. Maximum subject opinion is CT increase the risk of cancer. 37 subjects answered X-ray has high risk of radiation. 49 subjects told it is important to educate the patient regarding radiation risk before each investigation.

**Conclusion:** This study concludes that awareness in medical students about radiation exposure in diagnostic imaging was less. It required that implementation of basics in diagnostic imaging into the undergraduate course curriculum.

### KEYWORDS:

Medical students, Radiation, imaging, diagnostic, questionnaire, tomography, X-ray

### Introduction

Radiological investigations are the most important tools in the detection of various pathologies. They play major role in the diagnosis and give guidance for further treatment [1,2]. Various radiological imaging techniques are used in the diseases detection, mainly X-ray, Computed tomography (CT), ultrasound and Magnetic Resonance Imaging (MRI) [3,4]. Use of these diagnostic tools shows some effect on the human body. The effects of low level of exposure to ionizing radiation are of concern, especially in workers receiving exposure on job [5,6] Recent years concerns are growing over the risks associated with diagnostic imaging techniques increased lifetime risk of malignancy. The cancer development risk increased due to repeated exposure to these techniques [7]. Over the past years many studies in the various parts of world suggested that peoples working in the field of radiology required knowledge about radiation exposure. Knowledge about radiation exposure in the diagnostic radiology required even for undergraduates [8]. With this background the present study was conducted to evaluate the awareness of radiation exposure associated with diagnostic imaging investigations in medical students.

### Materials and Methods

#### Study settings and period

This study was conducted in the Department of Radiodagnosis, Kannur Medical College, Kerala. It was conducted in for 2 months in the period of 2017.

#### Study population

This study included medical students studying MBBS in the Kannur Medical College, Kerala. It was conducted in for 2 months in the period of 2017. Only 3<sup>rd</sup>, 4<sup>th</sup> MBBS and CRRIs were selected for the study and 1<sup>st</sup> and 2<sup>nd</sup> year MBBS students were not included in the study. A total of 60 students were included in the study. A questionnaire with 14 questions were prepared. All the students were asked to assemble in the Department of Radiodiagnosis by 9:30AM. Questionnaire was given to each student and 30 minutes time was given to fill the answers. All the students were asked to write their age, gender and year of MBBS. After the completion of time answer sheets were collected.

**Statistical analysis:** The data was expressed in number and percentage. Microsoft Excel 2012 was used to calculate the percentage.

### Results

This present study was conducted in 60 MBBS undergraduate

students. All the students said it is important to have awareness about the radiation in radiology. 41 students said that they do not have adequate knowledge regarding the radiation risk of various radiological investigations. 76.67% had no classes related to radiation risk and radiation protection. 68.33% students said that CT scan increase the risk of cancer. For a question about radiological procedures having risk of radiation, 40 students answered yes for PET scan, 34 bone scan and 9 for Doppler scan. 49 students said that it is important to educate the patient regarding radiation risk before each investigation (Table-1). 37 students said X-ray has risk of radiation, in comparison to CT(14), MRI(3) and Ultrasound(1) and 5 students said that there is radiation risk in all the four modalities. 37 subjects ticked that chest X-ray carries lower risk of radiation compared to CT studies. 49 students is ticked pregnant are more sensitive to radiation exposure. 40 students ticked that gonads are more sensitive to ionizing radiation. 40 students answered they will take repeat chest-X rays for resolution of lung abscess in child. 38 students opined that one CT chest is equal to 30-40 chest X-rays (Table-2).

### Discussion

The present study conducted to evaluate the awareness about radiation risk in various radiological procedures in MBBS undergraduate students. Some students believed that MRI and doppler used ionizing radiation. Many students do not believe that CT has cancer risk. All the radiological procedures using ionizing radiation are associated minimum to maximum radiation risk. The use of alternative methods can reduce the radiation risk. But better diagnosis and clinical decisions may be made by the radiological tests using ionizing radiation. The radiation exposure for medical purposes should have benefit to the patient. The radiation risk can change based on age, gender and other conditions. Due to these reasons medical undergraduate students require knowledge related to the radiation risk in various radiological procedures. Undergraduates will have lesser knowledge and awareness about radiation risk in radiological procedures compared to postgraduates, because undergraduates are yet to receive the classes on radiology. Jennifer et.al and Lee C in their study concluded that awareness about radiation risk in various diagnostic imaging is suboptimal in medical students and emergency department physicians [9,10]. This study results also supported that undergraduates have less awareness on radiation risk in various radiological procedures. There is requirement to include the topics on radiation risk and radiation protection in their curriculum. Small sample size is a limitation of the study.

### Conclusion

The present study showed that, medical undergraduates have less

awareness related to radiation exposures associated with diagnostic imaging investigations. There is a requirement of implementation of basics in radiation protection into the medical undergraduate curriculum.

**Conflict of interest:** Nil

**Table-1: Number and Percentage of yes and no the questions**

Q. No	Question	Yes		NO	
		Number	Percentage (%)	Number	Percentage (%)
1.	Do you think that awareness regarding ionizing radiations in radiology is important?	60	100.00	0	0.00
2.	Do you think that you have adequate knowledge regarding the radiation risk of various radiological investigations?	19	31.67	41	68.33
3.	Have you had any classes related to radiation risk and radiation protection?	14	23.33	46	76.67
4.	Do you think CT scan increases the life time risk of developing cancer?	41	68.33	19	31.67
5.	Which of the following modalities has radiation risk?	Number	Percentage (%)	Number	Percentage (%)
A.	Fluoroscopy	24	40.00	36	60.00
B.	Angiography	18	30.00	42	70.00
C.	PET scan	40	66.67	20	33.33
D.	Bone scan	34	56.67	26	43.33
E.	Scintigraphy	28	46.67	32	53.33
F.	Mammography	29	48.33	31	51.67
G.	Barium enema	21	35.00	39	65.00
H.	HSG	24	40.00	36	60.00
I.	Doppler scan	09	15.00	51	85.00
J.	MRI with contrast	14	23.33	46	76.67
6.	Do you think it is important to educate the patient regarding radiation risk before each investigation?	49	81.67	11	18.33

**Table-2: Number of subjects answered to each option in the question**

Q. No	Question
7.	Which among the following modalities has the risk of ionizing radiation [ ] a) X-ray(37)b) CT(14) c) MRI(3) d) Ultrasound(1)e) All of the above (5) f) None of the above(0)
8.	Which among the following investigations carry highest risk of radiation [ ] a) Chest X-ray(20)b) Plain CT chest(3)c) Plain CT abdomen(5) (d) CT Abdomen with contrast(32)
9.	Which among the following investigations carry lowest risk of radiation? [ ] a) Chest X-ray (37) b) Plain CT chest(7) c) Plain CT abdomen(11) d)CT Abdomen with contrast(5)
10.	Please tick the group of patients highly sensitive to radiation exposure [ ] a)Pregnant(49)b)Adolescents(1)c)Adults(3) d)Elderly(3) e)Infants(4)
11.	Which investigation would you prefer for an infant presenting with acute abdomen [ ] a)CT abdomen(12)b)MRI Abdomen(3)c)Ultrasound abdomen(39)d)All (6)
12.	Which organ is highly sensitive for ionizing radiation? [ ] a) Gonads(40)b) Bone marrow(15)c) Colon(1)d) Lungs(1)e) Bone surface(3)

13.	Which modality will you prefer to look for resolution of lung abscess in a child? [ ] a) Repeat chest X-rays (40) b) Repeat CT chest(13)c) Ultrasound(10)d) MRI(7)
14.	The radiation exposure in one CT chest is equal to how many chest X-rays [ ] a) 10-20(8)b) 20-30(9) c) 30-40(38) d) 50-60(13)e) 60-70(8)

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