(e) ISSN Online: 2321-9599

(p) ISSN Print: 2348-6805

ORIGINAL ARTICLE

ASSESSMENT OF KNOWLEDGE OF MEDICAL STUDENTS ABOUT RADIATION EXPOSURES ASSOCIATED WITH RADIOLOGIC DIAGNOSTIC IMAGING TECHNIQUES

Pinki Kumari

Assistant Professor, Department of Radiodiagnosis, RKDF Medical College, Hospital and Research Centre, Bhopal M.P.

ABSTRACT:

Background: Radiation is one of the factors with proven negative adverse effect on human and living beings. Most physicians significantly underestimated doses associated with various imaging modalities. Literature quotes paucity of studies evaluating the knowledge of medical students regarding relative radiation doses associated with different diagnostic imaging investigations. Hence; the present study was conducted to assess the knowledge and awareness of medical students regarding radiation exposures associated with common diagnostic imaging procedures. **Materials & methods:** The present study included assessment of knowledge and awareness of 480 medical students of the institute regarding radiation exposures associated with common diagnostic imaging procedures. The anonymous questionnaire followed a multiple choice format divided into two sections: section 1 included student demographics and a self-assessment of knowledge of radiology compared with other medical subjects, as well as previous exposure to instruction and lectures/teaching in radiology. Results were stratified according to gender difference, previous exposure to instruction or lectures/teaching in diagnostic radiology, teaching in radiation protection and perceived knowledge of radiology. **Results:** From all the medical professional years including the post-graduates, 80 students each were selected. Mean score among first and second year student was 7.01 and 9.21 respectively. Mean score among third year and fourth year was 9.50 and 10.01 respectively. Among interns and post-graduate students, the mean score was found to be 12.23 and 15.87 respectively. Among first and second year students, 92 and 99 percent of the subjects had associating ionising radiations in chest radiographs. **Conclusion:** Although an increase in knowledge of medical students with advancing professional year is seen, there is lack of overall awareness

Key words: Awareness, Medical, Radiation

Corresponding author: Dr. Pinki Kumari, Assistant Professor, Department of Radiodiagnosis, RKDF Medical College, Hospital and Research Centre, Bhopal M.P.

This article may be cited as: Kumari P. Assessment of knowledge of medical students about radiation exposures associated with radiologic diagnostic imaging techniques. J Adv Med Dent Scie Res 2017;5(2):45-48.

Access this article online	
Quick Response Code	Website: www.jamdsr.com
	DOI: 10.21276/jamdsr.2017.5.2.11

INTRODUCTION

One of the factors with proven negative adverse effect on human and living beings is radiation. The cancer causing biological effects of ionising radiation, including low doses received during medical diagnostic imaging, are well documented. 15% of all radiation exposures are attributed to medical x – rays as reported by US National Council on Radiation Protection and Measurement had reported that medical x-rays and nuclear medicine account for 15% of all radiation exposures.[1] Similarly, in the UK, estimated 100-250 deaths occur each year from cancers directly related to medical exposure to radiation.[2]

From the past few decades, there has been a drastic increase in the number of patients undergoing diagnostic radiology, in particular computed tomography(CT) scanning.Above doses of 50-100 mSv (protracted exposure) or 10-50 mSv (acute exposure), direct epidemiological evidence of human populations demonstrates that exposure to ionizing radiation increases the risk of some cancers.[3]Regarding the knowledge and attitude of radiation dose and associated risks among individuals of various specialities, many studies have been conducted in the past few years.Most physicians significantly underestimated doses associated with various imaging modalities.[4]

Literature quotes paucity of studies evaluating the knowledge of medical students regarding relative radiation doses associated with different diagnostic imaging investigations.[5]Hence; the present study was conducted to assess the knowledge and awareness of medical students regarding radiation exposures associated with common diagnostic imaging procedures.

MATERIALS & METHODS

The present study was conducted in the department of radiology of the medical institute and included assessment of knowledge and awareness of 480 medical students of the institute regarding radiation exposures associated with common diagnostic imaging procedures. A total of 400 medical students were included in the present study from March 2014 to May 2015. Ethical approval as taken from the institutional ethical committee and written consent was obtained after explaining in detail the entire research protocol. 80 students were included from all the medical years including the post-graduate students.

Theanonymous questionnaire followed a multiple choice formatdivided into two sections: section 1 included studentdemographics and a self-assessment of knowledge ofradiology compared with other medical subjects, as well asprevious exposure to instruction and lectures/teaching inradiology. The second section (section 2) assessed awarenessand general knowledge of radiation exposures associatedwith diagnostic imaging studies. Correct answerswere awarded one mark, whereas an incorrect answer oromission received a mark of 0. Results were stratifiedaccording to gender difference, previous exposure toinstruction or lectures/teaching in diagnostic radiology,teaching in radiation protection and perceived knowledgeof radiology. All the results were analyzed by SPSS software 16.0. Chi-square test and one way ANOVA was sued for the assessment of level of significance. P-value of less than 0.05 was taken as significant.

RESULTS

Table 1 and **Graph 1** show the mean scores from students of all years. From all the medical professional years including the post-graduates, 80 students each were selected. Mean score among first and second year student was 7.01 and 9.21 respectively. Mean score among third year and fourth year was 9.50 and 10.01 respectively. Among interns and post-graduate students, the mean score was found to be 12.23 and 15.87 respectively. **Table 2** and **Graph 2** show the percentage of subjects in all the years associating with ionising radiations in different modalities. Among first and second year students, 92 and 99 percent of the subjects had associating ionising radiations in chest radiographs.

Table 1: Mean scores from students of all years

Medical year	No. of Subjects	Mean score
First year	80	7.01
Second year	80	9.21
Third year	80	9.50
Final year	80	10.01
Interns	80	12.23
Post-graduates	80	15.87

Graph 1: Mean scores from students of all years

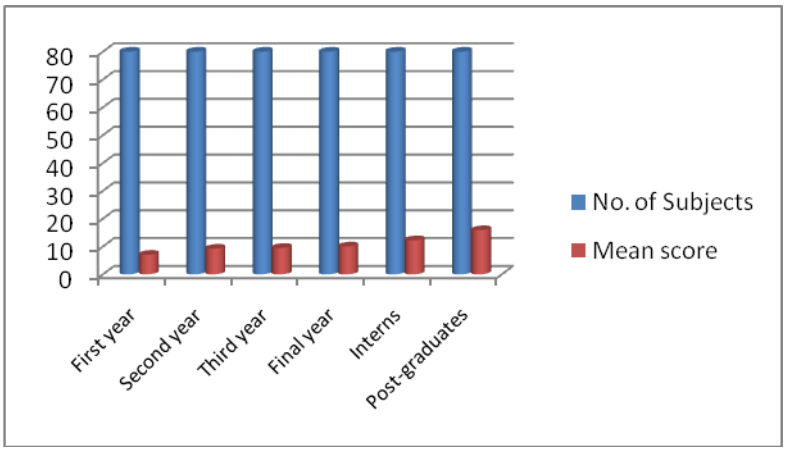
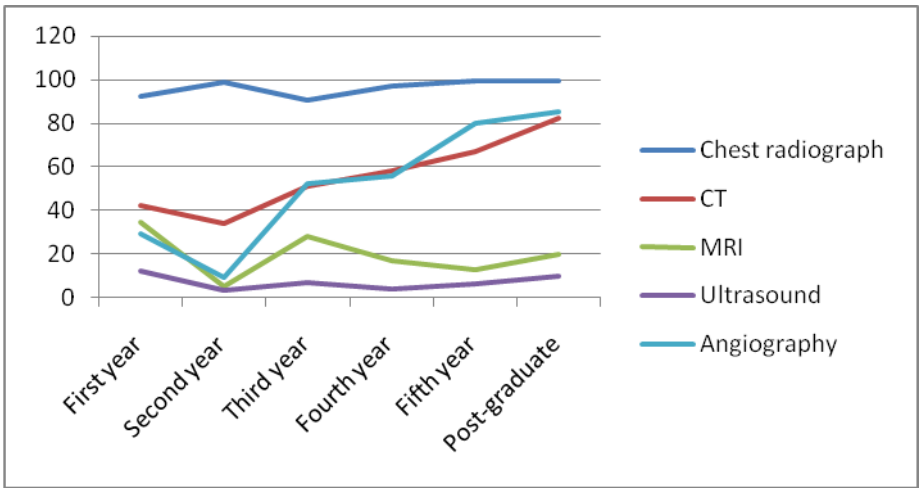


Table 2: Percentage of subjects in all the years associating with ionising radiations in different modalities

Imaging technique	First year	Second year	Third year	Fourth year	Fifth year	Post-graduate
Chest radiograph	92	99	90.5	97.2	99.5	99.5
CT	42.5	34.2	51.3	58.1	66.8	82.3
MRI	34.8	5.3	28.3	17.2	13.2	20.1
Ultrasound	12.3	3.5	6.8	4.1	6.2	10.2
Angiography	29.3	9.5	52.3	56.1	80.1	85.4

Graph 2: Percentage of subjects in all the years associating with ionising radiations in different modalities



DISCUSSION

Future of medical practitioners is presented by medical students, and according to the directive unless they are taught which imaging methods use radiation and the approximate quantity of radiation involved they will be unable to make appropriate informed clinical decisions.[6-8] Nowadays, medical imaging procedures involving the use of ionizing radiation are used daily in hospitals and clinics, making possible more accurate diagnosis of diseases and injuries.[9] However, the use of ionizing radiation such as X-rays is also associated with potentially harmful biological effects specifically; high radiation doses tend to kill cells, while low doses tend to damage or alter the DNA of irradiated cells.[10]Hence; the present study was conducted to assess the knowledge and awareness of medical students regarding radiation exposures associated with common diagnostic imaging procedures.

In the present study, we found that although formal radiation protection module is absent, an improvement in the knowledge of the students with advancing professional year is seen (**Table 1, Table 2**). Leong et al investigated impact of education on -on Radiation protection (RP) knowledge, student preferences for various teaching methods, self-assessment of RP knowledge, and perceptions of career prospects in radiology. Likert-type 5-point scale evaluations and general comments about the RP module and various methods of teaching were also obtained.An e-learning module -+in RP was designed and presented to year 4 medical undergraduates. All students were required to complete premodule and postmodule questionnaires.Eighty-nine percent (n = 113) and 99% (n = 126) of the 127 medical students successfully completed and returned the premodule and postmodule questionnaires, respectively. After the e-learning module, students' postmodule RP knowledge had improved significantly. Analysis of postmodule RP knowledge suggested that a favorable self-assessment of knowledge of RP, perception of career prospects in radiology, and completion of the e-learning module with an increased number of sessions were factors predictive of improved RP knowledge. Students expressed a preference for didactic lectures and clinical attachment for instruction in RP over e-learning.[11]

Leschied et al assessed second-year medical students' performance on case-based knowledge applications and self-assessed confidence related to ACR-AC guidelines compared to second-year students participating in a different concurrent radiology elective. Students participated in a 3-day elective covering the ACR-AC, comparative effective imaging, and risks associated with imaging radiation exposure, with outcomes of perceived confidence using a 5-point Likert scale and knowledge of ACR-AC using case-based multiple choice questions. Analysis included computing mean scores and assessing effect sizes for changes in knowledge. Before the elective, 24 students scored an average of 3.45 questions correct of 8 (43.1%). On course completion, students scored an average of 5.3 questions correct of the same questions (66.3%) ($P < .001$; effect size [Cohen's d] = 1.3940. In the comparison group, 12 students scored an average of 3.08 questions (38.5%) correctly pretest and 3.09 questions (38.6%) correctly post-test ($P > .85$; effect size = 0.008). Students' confidence in ordering appropriate imaging improved nearly 2-fold from a range of 1.9 to 3.2 (on a scale of 1.0 to 5.0) to a range of 3.7 to 4.5.[12, 13]

O'Sullivan J et al assessed students' awareness of radiation exposures and determined the impact a curriculum in clinical radiology (CICR) had on awareness. Six hundred seventy medical students at one medical school were studied. CICR was delivered in yearly modules over the 5-year programme. Five hundred twenty-three students (years 1–5), exposed to increasing numbers of CICR modules and 147 students beginning medical school (year 0), represented the study and control groups, respectively. Students completed a multiple choice questionnaire assessing radiation knowledge and radiology teaching. Most students in the study population received CICR but 87% considered they had not received radiation protection instruction.

The percentage of correctly answered questions was significantly higher in the study population than the control group (59.7% versus 38%, $p < 0.001$). Students who received CICR achieved higher scores than those who did not (61.3% compared with 42.8%, $p < 0.001$). Increasing exposure to CICR with each year of medical education was associated with improved performance.[14]

CONCLUSION

From the above results, it can be concluded that although an increase in knowledge of medical students with advancing professional year is seen, there is lack of overall awareness. Therefore; future educational programs are required.

REFERNECES

1. J. J. Stein, "The carcinogenic hazards of ionizing radiation in diagnostic and therapeutic radiology," Ca: A Cancer Journal for Clinicians, vol. 17, no. 6, pp. 278–287, 1967.
2. P. Scanff, J. Donadieu, P. Pirard, and B. Aubert, "Population exposure to ionizing radiation from medical examinations in France," The British Journal of Radiology, vol. 81, no. 963, pp. 204–213, 2008.
3. D. J. Brenner, "Fractionation and late rectal toxicity," International Journal of Radiation Oncology Biology Physics 2004; 60: 1013–1015,.
4. J. X. Wang, L. A. Zhang, B. X. Li et al. Cancer incidence and risk estimation among medical x-ray workers in China, 1950–1995. Health Physics 2002;82:455–466,.
5. Wall BF, Hart D. Revised radiation doses for typical X-ray examinations. Br J Radiol 70:437–439.
6. Lee C,Haims AH,Monico E, Brink J, FormanH. Diagnostic CT Scans: Assessment of Patient, Physician, and Radiologist Awareness of Radiation Dose and Possible Risks. Radiology. 2004; 231:393–398.
7. Soye JA, Paterson A. A survey of awareness of radiation dose among health professionals in Northern Ireland. Br J Radiol. 2008; 81(969):725–729.
8. Arslanoğlu A, Bilgin S, Kubal Z, Ceyhan MN, Ilhan MN, Maral I. Doctors' and intern doctors' knowledge about patients' ionizing radiation exposure doses during common radiological examinations. Diagn Interv Radiol.2007; 13(2):53–55.
9. H. E. Rice, D. P. Frush, M. J. Harker, D. Farmer, and J. H. Waldhausen, "Peer assessment of pediatric surgeons for potential risks of radiation exposure from computed tomography scans," Journal of Pediatric Surgery, vol. 42, no. 7, pp. 1157–1164, 2007.
10. A. D. Quinn, C. G. Taylor, T. Sabharwal, and T. Sikdar, "Radiation protection awareness in non-radiologists," British Journal of Radiology, vol. 70, pp. 102–106, 1997.
11. Leong S, Mc Laughlin P, O'Connor OJ, O'Flynn S, Maher MM. An assessment of the feasibility and effectiveness of an e-learning module in delivering a curriculum in radiation protection to undergraduate medical students. J Am Coll Radiol. 2012 Mar;9(3):203-9.
12. Leschied JR, Knoepp US, Hoff CN, Mazza MB, Klein KA, Mullan PB, Kelly AM. Emergency radiology elective improves second-year medical students' perceived confidence and knowledge of appropriate imaging utilization. Acad Radiol. 2013 Sep;20(9):1168-76.
13. Arslanoğlu A, Bilgin S, Kubal Z, Ceyhan MN, Ilhan MN, Maral I. Doctors' and intern doctors' knowledge about patients' ionizing radiation exposure doses during common radiological examinations. Diagn Interv Radiol. 2007;13(2):53–55.
14. O'Sullivan J, O'Connor OJ, O'Regan K, et al. An assessment of medical students' awareness of radiation exposures associated with diagnostic imaging investigations. Insights into Imaging. 2010;1(2):86-92.

Source of support: Nil **Conflict of interest:** None declared