A Review for Medical Students and Residents of Birjand University of Medical Science Awareness Levels of Basic Principles in Radiologic Imaging

Background: Inadequate use of these techniques probably increases the risks of radiography. This study has been accomplished in 2016 to determine medical students and residents of Birjand University of medical science awareness levels of principles of protection in radiologic imaging.

Methods: In this descriptive research, all medical students, including externs, interns, radiology residents and residents of the other fields at Birjand University of medical science in 2016 were targeted. Data was collected with a questionnaire made by the researcher, containing 20 questions in three fields: basic principles of protection in radiology imaging, justification in radiology imaging and applied aspects of protection in radiologic imaging. Justification and statistical quality of this questionnaire have been approved. Data was analyzed by SPSS16 program and Krukal-Wallis test and Mann-Whitney U tests.

Results: 170 people have been targeted in this study, including 88 (51.8%) externs, 39 (23.5%) interns, 7 (4.1%) radiology residents and 16 (9.6%) residents of the other fields. The average score of awareness had no significant difference between male and female students (p<0.05). The result of Mann-Whitney U test represents that the total score and the average score for the basic principles and applied aspects for externals compared to interns and residents was too low (p<0.05).

Conclusions: As there is an important role for Radiologists and low awareness of students and residents of Birjand University of medical science awareness levels of basic principles of protection in radiologic imaging, justification in radiology imaging and applied aspects of protection in radiologic imaging, radiology residents and residents of other fields at Birjand University should be educated and perform more periodic exams in order to increase the level of knowledge in students.

Keywords: Radiance, Radiology, Radiography, Awareness, Student

ORIGINAL ARTICLE

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INTRODUCTION
Radiologic imaging is an important diagnostic method in healthcare services (1). About 30% to 35% of medical decisions, especially on emergency cases are made upon radiologic findings (2).

It’s an inevitable radiologic imaging to diagnose an illness and obtain the progress of it. There is no doubt about the benefits of radiography but still it can be potentially harmful because of ionizing radiations and improper use may increase the possible risks (3). Contacting ionizing radiations more than admissible amounts can affect the hematologic system, gastrointestinal system, central nervous system, or the whole body finally or may affect the second generation (4).

Applying protection measures are necessary for using of ionizing radiations. These measures can help to capture diagnostic pictures with a higher resolution, besides, both patients and workers, will receive lower amounts of the ray. Recently, new instructions about radiation protection during radiologic work up had been published by international commissions such as ICRP and IAEA (5, 6). Since radiology technologists have a critical role in applying protection measures, they’re directly involved in processing, radiology examinations so they need to be aware of instructions to help reduce the radiation dose and they also need to have a great vision and function to decrease the risks to the least.

We can precise more in using devices and reduce attention when we know about physical points of radiology such as potency and tube’s heat capacity and also we need to have information about radiography artifacts such as distortion, magnification, noises and etc.

Ionizing radiation is one of the most harmful agents in workplaces which can have serious and incurable effects on people who work with these radiations or people who refer to radiology ward for diagnosis and treatment (7).

With a proper and justified use of personal protection devices and following rules and instructions on protecting the buildings which contain generators or ionizing rays source, these damages could be avoided. Therefore, radiology workers awareness of these instructions could have an important role in radiological protection (8). So radiology residents would need to be gratefully taught about radiological protection and care about precautions while doing radiology examinations (9).

Because of the importance of radiation protection principles, this study has been accomplished in 2016 to determine medical students and residents of Birjand University of medical science awareness of the principles of protection in radiologic imaging.

METHODS
In this descriptive study, all medical students, including extern, interns, radiology residents and residents of other fields in 2016 at Birjand University of medical science were targeted. After explaining the goal of study and encouraging people to answer carefully and emphasizing on this fact that there is no need to mention their personal information, the questionnaire evaluation of awareness of protection principles made by the researcher was answered by people.

Data was collected by the questionnaire made by the researcher containing 20 questions in three fields: basic principles of protection in radiology imaging (10 questions), justification in radiology imaging (5 questions), and applied aspects of protection in radiology imaging (5 questions). The questionnaire was designed with multiple choice questions with a correct choice and three incorrect choices, each correct answer had 1 point and each incorrect answer had 0 points. Summation of points in each field is assumed as the score of that field. Justifiability of this questionnaire was approved by skillful professors and to realize the stability of the questionnaire, 20 radiology students were examined by the questionnaire in test-retest method and coefficient of correlation between the scores was 0.87.

Data was analyzed by statistic program SPSS16. first it was checked by Kolmogorov-Smirnov test to configure normal distribution. Since there wasn’t normal distribution, we used chi-square, Kruskal-Wallis test and Mann-Whitney U tests at a significance level of 0.05.

RESULTS
170 people had been targeted in this study, including 88 (51.8%) externs, 59 (35.7%) interns, 7 (4.1%) radiology residents and 16 (9.4%) residents of the other fields. 45 externs (51.1%), 31 interns (32.5%), 4 radiology residents (57.1%) and 9 residents of other fields (56.3%) were female (p=0.90).

The average score of awareness was 3.82±2.70 and in three fields of basic principles of protection, justification and applied aspects of protection, the average score was 3.63±1.49, 2.54±1.15 and 1.68±1.03 in a sequence. There was no significant difference between male and female in the average score of awareness and all three fields (p>0.05) (Table1).
The Kruskal-Wallis test showed no significant difference in the average score of justification in radiography between all groups (p=0.07) but there was a significant difference between groups for the average of the total score and the score of basic principles of protection and applied aspects of protection (p<0.05). The result of Mann-Whitney U test represents that total score and the average score for basic principles and practical aspects for externs compared to interns and residents is too low (p<0.05) but there was no significant difference between other groups (Table 2).

**DISCUSSION**

In this study, the average score of awareness in total was 8.82 ± 2.70 (from a total score of 20) and the average scores in each field were 1.49 ± 3.63 (from a total score of 20), 1.45 ± 0.95 (from a total score of 10) for justification and 1.45 ± 0.95 (from a total score of 10) which show poor awareness for people in study groups. Shah et al had a study on radiology workers’ occupational skills and their score for information about radiation specific sciences was 65.5 percent and more than the medium level which showed their information is in a good status (10). In Saberi et al study radiology workers information about radiology science was in a medium level with a maximum score of 67.9 in physics lesson and a minimum score of 60.3 in radiology lesson (11). In Chaparian et al study results about the review on radiological protection awareness in 114 radiological technologists in five medical centers in Taiwan configured that the average score of technologists’ awareness is 62.63% (12). A study was accomplished by Shah et al which checked 41 technologists‘ awareness levels of radiological protection in three hospitals and there was an average score of 75% for radiological protection (13). In Chaparian et al study, the average score of awareness in radiographers in Yazd was 46.50 ± 5.30 (14). The average score of technologists’ awareness is 65.83% (12).

<table>
<thead>
<tr>
<th>Variant</th>
<th>Extern Mean ± SD</th>
<th>Intern Mean ± SD</th>
<th>Radiology resident Mean ± SD</th>
<th>Resident of other workplaces Mean ± SD</th>
<th>p-value related to cr...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic principles of protection</td>
<td>1.38±3.32</td>
<td>1.57±3.90</td>
<td>1.13±4.57</td>
<td>1.61±3.94</td>
<td>0.02</td>
</tr>
<tr>
<td>Justification</td>
<td>1.08±2.40</td>
<td>1.18±2.53</td>
<td>1.07±3.14</td>
<td>1.26±3.13</td>
<td>0.07</td>
</tr>
<tr>
<td>Applied aspects of protection</td>
<td>0.97±1.45</td>
<td>1.03±1.90</td>
<td>1.25±2.71</td>
<td>0.95±1.69</td>
<td>0.007</td>
</tr>
<tr>
<td>Awareness in total</td>
<td>2.70±8.08</td>
<td>2.54±9.63</td>
<td>2.04±10.14</td>
<td>2.54±9.31</td>
<td>0.002</td>
</tr>
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**ACKNOWLEDGMENTS**

We are grateful to all students and residents who participated in our study despite their busy schedules. We also thank Faeze Heidari (student of medicine, faculty of medicine, Birjand University of medical science, Birjand, Iran) for providing editorial supports.

**Conflict of interest:** The authors declared no conflict of interest.
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