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Survey Radiation Health Awareness in Patients Referring to Behbahan Hospitals in south of Iran

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Abstract

The present study targets to delve into the patients' awareness of the risks of imaging experiments and also to identify the gaps existing in the radiation health training to the patients regarding the demographics such as age, education and etc. This research is a descriptive cross-sectional study done during 2019-2020. The study was conducted as a questionnaire on 319 patients selected randomly. The questionnaire consisted of 34 options in various areas including demographics, the awareness of different imaging modalities and also the patients' expectations of physicians about the training level required for the imaging modalities. The data were collected by question-answer method run by the researcher and analyzed by SPSS. The mean score of radiation health awareness in the study participants was estimated as 65.89% ± 14.37% and this rate was 67.15% ± 32.06% and 64.13% ± 13.75% in the women and men, respectively. The study revealed the majority of the patients (60.2%) with average radiation awareness and also the average radiation health awareness rate in the participants as bachelor, master and illiterate as 66.14% ± 63.16%, 72.15% ± 28.48% and 59.72% ± 4.96%, respectively. Despite the individuals being highly willing (more than 90%) to receive information from their physicians about the required test, the level of the information trained by the physician to the patient is low (almost below 50%). Most of the study subjects lacked thorough radiation health awareness; even the study awareness about different questioned areas was highly different. Lack of awareness of safe imaging of pregnant women and the background radiation was minimized. Thus, regarding the significance of the individuals' knowledge of the radiation risks, it is necessary for the relevant agencies and authorities taking the due measures to raise public awareness in this area.

Keywords: Awareness • Radiation Health • Hospital • Patient

Introduction

Most of the imaging modalities are done by ionizing radiation that can be employed in medical diagnoses. Today, such studies have a remarkable effect on medical diagnoses and also can bring about some harms such as cancer and genetic mutations [1,2]. In the last 60 years, lots of efforts have been made to lower the radiation induced effects; so that in the recent years, very practical activities have been taken to optimize the dose and reduce the radiation induced effects [3]. On the one hand, in order to protect against radiation, Turkish Atomic Energy Organization and ICRP introduced the ALARA principle (the less, the more justifiable) about radiation safety in the world and in Turkey. This principle puts the protective perspective in the best way possible [4]. One of the measures to reduce the radiation dose the patients are exposed to is their awareness of the imaging modalities and also their potential incurred risks. Moreover, perpetually educating the patients can make the patients aware and it even helps the physicians [5,6]. These days, in some countries, the patients can further participate in their medical decision making. While some patients insist on redundant imaging at the time of diseases or incidents. Then it's imperative to be aware of the ionizing radiation induced impacts so that to make accurate decisions. Chaparian did a research revealing the patients' awareness score as 56.21%. Although these patients (95.6%) expected their physicians to explain about the potential risk of every test, only 6% of the physicians gave them the required explanation [5]. Other studies have been performed about radiation in Iran and other parts of the world [2-8]. The current research targets to evaluate the awareness of the radiation risks among the patients referring to the imaging centers.

Literature Review

The current research is a descriptive-analytical of cross-sectional type done on the patients referring to Behbahan located Imaging Centers during 2018-2019. This study was performed on 319 patients. These patients were randomly selected. It's worth noting that the questions were posed in the form of interviewing the subjects. The study questionnaire whose reliability and validity was confirmed was previously employed in another research in Iran [5]. Of course, we have remeasured its reliability and validity, and using Test-Retest Reliability, the Alpha-Cronbach has been estimated at 0.7 as an acceptable score for this test.

The present questionnaire consists of 34 items in three different groups. The parts included the demographics, radiation health awareness of various medical imaging modalities and also the patients' expectations of the physicians to present radiation related training in the required imaging experiments. The questionnaire was randomly handed to the patients referring to the relevant imaging centers. Of course, these questionnaires were filled in as question-answer (Q & A) between the researcher and the patient. At the end, the questionnaires were analyzed by SPSS-22 and the results were analyzed descriptively by comparing with those of other studies.

Findings

Out of total 319 study participating patients, about 55.8% consisted of women and 44.2% of men. The study population demographics were depicted in Table 1 where the max participation involved the patients with master degree (37%) and also the study subjects were more the individuals referring to plain radiography experiment (about 44%). The patients' awareness score was reported normal by Kolmogorov-Smirnov test. The patients' awareness' mean and standard deviation scores were gained 65.89 and 14.37 and the median at 62.5 and the awareness subgroup options' Alpha-Cronbach coefficient was 0.7.

Table 1. Demographic information of the participants in the study.

Variable		Number	%
Gender	Man	178	44.2
	Woman	141	55.8
Education	Illiterate	9	2.8
	Primary & secondary school	35	11
	Diploma	111	34.8
	Associate degree	26	8.2
	Bachelor	118	37
	Master and higher	20	6.3
Types of tests	Plain radiography	141	44.2
	Radiography with contrast	1	0.3
	Mammography	37	11.6

	Dental radiography	36	11.3
	CT scan	53	16.6
	M.R.I	50	15.7
	Sonography	1	0.3

In Table 2, the relationship between the patients' gender and their awareness score using T-Test is given. Concerning P-value achieved between gender and awareness score, no meaningful relationship was found. Besides, in the table the relationship between the patients' degree and their awareness score using ANOVA has been indicated. Regarding the obtained P-values, the relationship between the patients' degree and their awareness score was significant (p>0.001) so that the higher their degree, the more their awareness score increased. Table 3 depicts the study patients' awareness status, the majority of them had average awareness (60.2%) and only 3 ones had poor awareness.

In Table 4, the study radiation health awareness level about imaging experiment induced risks has been analyzed. The information about MRI and its effects on pregnant women has been in the last state (around 15%), though the study subjects had the highest information about CT Scan and plain radiology (around 90%-95%).

Table 2. Comparing patients' awareness relative score mean & S.D in terms of gender and education.

Variable		**Awareness score**
		Mean ± S.D
Gender	Man	64.13 ± 13.75
	Woman	67.15 ± 32.06
	P-value	0.124
Education	Illiterate	59.72 ± 4.96
	Primary & secondary	55.9 ± 12.75
	Diploma	61.11 ± 37.15
	Associate degree	72.11 ± 28.48
	Bachelor	72.15 ± 28.48
	Master and higher	66.14 ± 23.16
	P-value	0.001

Table 3. Frequency distribution of patients' awareness status.

Awareness status	**Poor**	**Average**	**Good**
Frequency number	3	192	124
%	0.9	60.2	38.9

Table 4. Number and percentage of individuals answering every certain option correctly.

Question		**Number**	**%**
1. In which of the following modalities, X-ray has been used?	Plain radiography	215	67.4
	Radiography with contrast	164	51.4
		111	34.8
		125	0
	Mammography	163	39.2
	Dental radiography	231	51.1
		274	72.4
	CT Scan	300	85.9
	MRI	275	90.6
		260	94
	Sonography	306	86.2
2.Can the following experiments be used for safe imaging for pregnant women?	Plain radiography	49	81.5
		295	
	Radiography with contrast	274	95.9
		270	15.4
	Mammography	272	92.8
		218	
	Sonography	202	85.9
		204	84.6
	CT Scan	205	85.3
	M.R.I	172	
3.Does radiation increases cancer risk ?		63	68.3
4.Should the patient's attendant accompany in the imaging room during radiography?		107	63.3
5.Does radiography raises the potential cancer risk ?	-	-	64.3
6.Does increasing radiography raise the potential cancer risk	-	-	53.9
7.Does wearing heavy clothes during radiography reduce the potential cancer risk?	-	-	19.7
8.Is plain radiography induced risk lower than CT Scan ?	-	-	33.5

Conclusion

The mean score of the study participants' awareness is gained as 65.89% ± 14.37%. Generally speaking, it can be stated that the patients' awareness of the radiation risks has been average. This score has been varied among different educational groups and diverse genders. Although, the mean score of awareness in female patients (67.32% ± 15.06%) was higher than that of the male ones (64.76% ± 13.75%), this difference wasn't statistically meaningful (p=0.124). In the research by Baykan done on 24 men and 26 women, the mean awareness score of the women patients (X=9.92) was more than that of the men ($\bar{x}$=8.87) and this difference wasn't statistical significant (p=0.081) [4]. To increase the radiation-induced risks' awareness, especially in women can effectively diminish radiation incurred risks to the fetus.

One of the most critical factors affecting the awareness of radiation induced risks and consequently, to reduce its incurred damage is education [4].

Overall, it can be mentioned that as education increases, the awareness level rises. ANOVA derived results suggest that this difference is significant (p=0.001). However, the relationship between awareness and education didn't reveal a regular trend so that the average awareness among the participants with postgraduate education (66.63% ± 14.16%) was lower than the participants with bachelor education (72.15% ± 28.25%) and in the participants with primary and secondary education (55.12% ± 9.75%), it was lower than the illiterate ones (59.72% ± 4.96%). The highest awareness score was gained by the participants with master and associate degree and the lowest was of those with primary and secondary education. In the research by Chaparian, it was reported that as education gets more, the individuals' awareness about radiation-induced risk increases. So that the min awareness score was obtained by the participants with no education (36.81% ± 17.21%) and those with primary and secondary education (45.54% ± 13.53%), and the max awareness score was gained by the participants with postgraduate education (65.63% ± 14.31%) and those with bachelor degrees (64.46% ± 17.40%) [5]. This trend was observed in the study by Takakuwa and Sin [9].

Analyzing the participants' answers in Table 4, you can get a picture of their awareness level to evaluate. Around 67% of the participants were conscious that X-ray is used in plain radiography. Also around 35% of the participants was aware that X-ray is used in mammography. In the study by Yucel et al., (2009), this level was found 68% and 33%, respectively [10]. Besides, the study derived results denoted that about 72% of the participants was aware of not using ionization radiation in MRI. While this level of awareness was 20% and 33%, respectively in the research done by Chaparian and Yucel [10]. Thus, it can be mentioned that the patients' input in MRI has been at good level.

About the issue known as safe imaging of pregnant women, merely 15% of the participants was conscious of the safety of MRI, while the patients' information about using plain radiography (around 91%), contrast radiography (94%) and CT Scan (96%) was good.

The participants' general knowledge about radiation induced carcinogenicity during imaging (items 14-17) was satisfactory so that more than 85% of the patients were aware of X-ray's carcinogenicity. This level was 72% and 91%, respectively, in the studies done by Yucel and Chaparian [5,10]. The participants' general knowledge bout background radiation was very low so that only 20% was conscious of background radiation. While in case of lack of knowledge and not being controlled, background radiation can play a significant role in creating many diseases. In the research by Malwadde, none of the participants were aware of this area [11]. Moreover, just about 33% of the participating individuals were conscious of being exposed to ionization radiation while being on flights. In the study of Chaparian and Sin, this level was reported as 33% and 50%, respectively [5,12]. Therefore, it's imperative to take the due measures in order to raise the general awareness level about the background and cosmetic radiation. Besides, almost 54% of the patients were aware of the home incurred radiation hazards. General awareness about other items was better (more than 63%).

To put it generally, the study participants' awareness of the radiation risks, except for safe imaging of pregnant women and background radiation was relatively satisfying. Regarding the information included about the patients' expectations of the physician and also the physician's performance, it has been determined that a few number of the physicians explained about the requested experiments. While the patients are highly enthusiastic to be given the information and overall, the lack of pre-test radiation health training about the relationship between the patient and the physician is perceived. Thus, considering the individuals' awareness level bout radiation health and X-ray hazards being significant and necessary, the related authorities and agencies are required to take the necessary measures, whether informing via national media, holding training courses, or including radiation relevant subjects in the primary course titles and other due measures.

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