

Radiology

KEYWORDS: Significant results were obtained in the apical region of the roots with Pro AF Baby Gold pediatric rotary endodontic file.

EVALUATION OF KNOWLEDGE, AWARENESS, AND ATTITUDE OF MRI TECHNOLOGISTS TOWARDS MRI SAFETY IN DHAKA CITY OF BANGLADESH



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OF PURE MEDICAL RESEARCH**ABSTRACT**

Magnetic resonance imaging, or MRI, is a way of obtaining detailed images of organs and tissues throughout the body without the need for x-rays or "ionizing" radiation. Magnetic resonance imaging (MRI) has a superior soft-tissue contrast compared to other radiological imaging modalities and its physiological and functional applications have led to a significant increase in MRI scans worldwide. Though an MRI examination causes no pain, and the electromagnetic fields produce no known tissue damage of any kind, the MR scanner may make loud tapping, knocking, or other noises at times during the procedure. The powerful magnetic field of the MR system can attract objects made from certain metals (i.e., known as ferromagnetic) and cause them to move suddenly and with great force. This can pose a possible risk to the patient or anyone in the object's "flight path." Therefore, great care should be taken by healthcare professionals related with MRI.

There are several safety issues to be considered by the radiologist, clinicians, MRI Technologist, nurses and medical physicists involving with MRI examination. The purpose of this study was to examine the awareness level of MRI technologist regarding MRI safety and to emphasize the level of knowledge and attitude towards MRI safety to prevent accidents in the MR environment.

This is a preliminary descriptive study aimed to evaluate radiological technologist knowledge and performance towards radiation protection during hospital practice. Total of 50 MRI technologists working in various hospitals were participated in this study and data was collected through well-structured pretested self-administered questionnaire. Among 50 MRI technologists responded to this study, there were 96% male and 04% female where most of them (64%) were from age group 26-35 years. Regarding education level diploma holders were 54 % and Graduate holders were 46% and this study found some relations between level of education of participants and work expertise with their knowledge around necessity performance of periodical examination. But according to data analysis there was no significant relation between awareness of MRI safety, performance and work experience. A comprehensive MRI safety training is essential to protect patients and other

healthcare workers from potential bio-effects and risks of the magnetic fields in an MRI suite.

INTRODUCTION

Today Magnetic resonance imaging (MRI) is the most advancing imaging techniques. MRI is a diagnostic tool that uses magnetism and radio waves to produce high-resolution images of structures and organs inside the body. Compared to the x-ray based medical diagnostic techniques e.g. general radiography, positron emission tomography (PET) and computed tomography (CT), MRI does not employ ionizing radiation but uses radiofrequency (RF) fields. Therefore, the modality is considered to have less health effects than the ionizing radiation-based imaging modalities.

MRI is safe but comes with great risk; not only for the patient, but also for health care professionals and any other personnel who may come in contact with the magnetic fields in or around the scanner. In 2001, a 6-year-old boy was killed while undergoing an MRI scan when a nurse, overhearing a request for oxygen, brought an oxygen tank into the scanner room. The tank became a deadly projectile and fractured the child's skull. This tragic incident and other adverse events highlighted a need for a formal MRI safety review.

An MRI examination causes no pain, and the electromagnetic fields produce no known tissue damage of any kind. The MR scanner may make loud tapping, knocking, or other noises at times during the procedure. Earplugs are provided to prevent problems that may be associated with this noise. At all times, you will be monitored and you will be able to communicate with the MRI technologist or the MR scanner operator using an intercom system or by other.

The increasing clinical demand for Magnetic Resonance Imaging (MRI) with its superior soft-tissue contrast compared to other radiological imaging modalities and potential physiological and functional applications has contributed to the MRI scanners. Therefore, more and more healthcare professionals need to be trained in MRI safety to protect patients and other healthcare workers from the potential risks of MRI. It is also important that radiologists, referring physicians and MR technologists are able to evaluate MRI safety and compatibility of medical devices and implants because they are often the first health care professionals who will talk to a patient about an MRI exam, potential risks, and MRI safety.

MATERIAL AND METHOD

This is a preliminary descriptive cross sectional study among 50 MRI technologists working in various hospitals and Diagnostic center (Private and govt.) in Dhaka city.

Tool of data collection: The study was conducted through a well-structured self-administered questionnaire and Verbal consisting of four parts:

- First Part: Socio- Demographic data (age, sex, level of education and working experiences).
- Second Part: Knowledge regarding MRI Safety Basics and Patient safety (11 question).
- Third Part: Performance towards Procedure (10 question).
- Fourth Part: Verbal (if have any doubt for 2nd and 3rd part)

Explanation about the objectives of the study and the benefit of its to MRI technologist was provided to each study participant before submitting the questionnaire. Then questionnaire forms were directly distributed to all MRI technologists who work in various hospitals and diagnostic centers and only 50 MRI technologists participated in this study and completed the forms. After data collection, Data was checked, verified, and processed to reduce error. Then it was analyzed by computer.

Ethical considerations:

All participants were consented verbally to fill the questionnaires and join the study and no names or any personal data were available to publish.

Results

Table 1: Socio- Demographic data of all respondents (N=50)

Demographic Data	Variable	Number (N)	Percentage
Sex	Male	48	96%
	Female	2	4%
Age	18-25 Years	05	12%
	26-35 Years	32	64%
	36-45 Years	10	20%
	46-60 Years	3	6%
Educational Qualification	Diploma	30	60%
	B.Sc.	20	40%
Working Experience	1-5 Years	14	37%
	6-10 Years	17	43%
	11-16 Years	10	12%
	17- more	9	10%
Working Place	Govt. Hospital	10	20%
	Private Hospital	20	40 %
	Diagnostic	20	40 %

Table (1) demonstrates that most of participants were from age group (26-35Y) and 96% are male. In education most of them are Diploma holders (60 %) and 40% has working experience of 6 to 10 years and most of them are working (80%) in non-government healthcare centers.

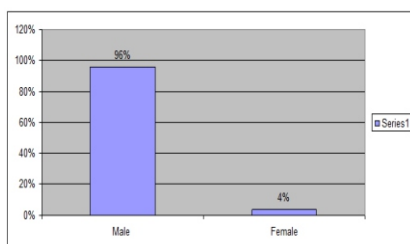


Figure 1: Distribution of participants according to gender

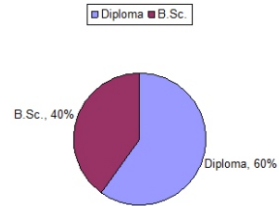


Figure 2 : Distribution of participants according to Educational Qualification.

Table 2: Knowledge of participants regarding MRI safety . N=50

Variable	Total Participants	No. of participants having graduate degree (Correct ans.)	No. of participants having no graduate degree (Correct ans.)	Total Correct answer (%)
01 Is MRI a part of nonionizing Radiation?	50	15 (75%)	15 (50%)	60%
02 MRI Magnet is kept ON at all time.	50	19 (95%)	29 (95%)	96%
03 Yellow, Green, Red Labeling Color is used for MRI safety sign.	50	18 (95%)	17 (56%)	70%
04 Ferrous Metals are not allowed in Magnet room.	50	19 (95%)	28 (93%)	94%
05 Titanium is allowed in MRI Room	50	19 (95%)	25 (83%)	63 %
06 Liquid helium cools down the superconductive magnets coil in MRI machines to a temperature of -269°C.	50	20 (100%)	29 (95%)	98 %
07 Where are emergency shut-down buttons located?	50	11 (55%)	15 (50%)	41 %
08 Magnetic objects are allowed in MRI room.	50	20 (100%)	30 (100%)	100%
09 Liquid Helium is most common cryogen used in MRI units.	50	20 (100%)	30 (100%)	100%
10 Only Superconductive Magnetic field will strongly attract any ferromagnetic objects	50	04 (20%)	07 (23%)	18 %

From Table 2:- it was revealed that although MRI Technologist have good knowledge on allowed and not allowed components, comparatively they have very poor knowledge on emergency condition, safety sign and on the behavior of magnet. Although we know how much essential to have all knowledge regarding the above-mentioned topics for an MRI technologist, it is also shown from table 2 that the technologists having B.Sc. degree have more knowledge regarding MRI safety.

Table 3 : Performance and awareness of participants toward Patient safety during practices N=50

01	1st Trimester MRI is not fully safe for pregnant Patient	50	18 (90%)	27 (90%)	63%
02	Will there be any problems, if Technologist doesn't give hearing protection of patients and volunteers?	50	14 (70%)	22 (73%)	72 %

03	Which items may create a health hazard or other problem during an MRI exam?	50	15 (75 %)	24 (80%)	54 %
04	If you get any patient having Clustophobia or anxiety, primarily you should counsel patient?	50	100 %	100 %	100 %
05	Zone III and IV are restricted for every person without preparation.	50	15 (75%)	20 (66%)	70 %
06	Tattoos or tattooed eye-liner containing ferromagnetic material can cause burns	50	14 (70%)	22 (73 %)	72%
07	When Emergencies are called during MRI procedure?	50	20 (100)	30 (100%)	100 %
08	What should be the properties of Safe materials to be used in MRI suit?	50	20 (100%)	29 (96 %)	99%
09	Has Gadolinium any risk for Pregnancy Patient?	50	11 (55 %)	12 (40 %)	46 %
10	Which button is pushed when there is loss of superconductivity in magnets and when temperature is raised?	50	10 (50%)	15 (50%)	50 %

Regarding Performance and awareness of participants toward Patient safety during practices it had been revealed that there is lack of practice and awareness about MRI protection devices. Moreover, many of them had no knowledge on different zone of MRI suit and the details of contrast agent used in MRI practices (Table 3). From table 3 it can also be justified that education level may be a factor to have better knowledge.

Table 4: Attitude and belief about MRI Safety N=50

According to knowledge and experience what do you think about MRI Safety?		
Very dangerous	Dangerous	Not dangerous
40%	40%	20%

Discussion

In this preliminary descriptive study awareness was assessed by measuring knowledge of MRI technologist towards MRI safety during practice in Dhaka city of Bangladesh. A total of 50 MRI technologists responded to this study, from them there were 96 % male and 04% female and age ranged between 26 to 35 years. Most of them have only Diploma degree in education (60 %). Furthermore the study did not find any relation between level of education of participants and work expertise with their knowledge around necessity performance of periodical examination and also application of organ shield for patients and themselves.

The working experience of the participants in this study ranged between one year and 46 years. According to data analysis, there was significant relation between awareness of MRI safety, performance and work experience but not more. It is noticed that there is a lack of adequate knowledge regarding different zone of MRI, contrast used in MRI practice. The knowledge of the purpose of safety zones in an MRI suite as well as MRI appropriateness criteria is important for all healthcare professionals who will work in the MRI environment or refer patients for MRI scans.

Moreover it had been shown that the respondents are not so aware on the use of protective devices. Though most of respondents think that MRI is a dangerous thing but it seems that they did not have such awareness practice and attitude towards MRI safety.

Conclusion:

MRI safety cannot be taken lightly. With this powerful imaging tool great risk may come to patients, caregivers, health professionals, and any other personnel who may come in contact with the magnetic fields in or around the scanner. Ongoing technological advancements and MR imaging diversifying into different disciplines, such as radiation oncology have added another layer of difficulty in ensuring that MRI safe practices are being maintained. A thorough knowledge of the MRI equipment, imaging principles, contrast media used in MRI, adherence to safe practices, written guidelines, and standardized protocols that can be used center-wide is ultimately the goal in creating an MRI safety culture.

Considering the results of this study it is important for all radiology technologists to continuing professional development; by holding more workshops, short-term training courses, preparation and distribution of posters on the protection against patient safety and image noise and safety against MRI in order to raise knowledge and performance to include the most recent trends in MRI safety. Similar studies with larger sample size at regular intervals should be carried out in Dhaka city for strict adherence of standard MRI safety and image noise regulation protocol. It is an urgent need for MRI facilities to implement safety guidelines and some safety training and higher education.

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