

Original Research Article

Knowledge and perception of magnetic resonance imaging safety among patients

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Received: 28 August 2023

Revised: 02 October 2023

Accepted: 07 October 2023

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ABSTRACT

Background: MRI knowledge and safety are very important not for only MRI technicians, doctors, professionals but also for patients who are undergoing MRI examination. The key purpose of this research to evaluate the knowledge and perception of MRI Safety among patients, as accidents can happen due to patient's insufficient knowledge regarding MRI.

Method: The retrospective study was performed around 50 patients at Maharishi Markandeshwar institute of medical sciences and research, Ambala, Haryana. Questionnaire design was used to assess their knowledge and perception. The questionnaire form was filled by an investigator directly discussion with patients and the data was collected and analyzed using Microsoft excel sheet.

Result: It was assessed that how much knowledge and what is the perception of MRI study among patients. There were 23 (46%) female and 27 (54%) male in different age group. In response to question regarding how patients felt before MRI scan, 16% patients felt panic, 10% sensed fear and panic, fear and anxiety were experienced by 6% patients, fear was the emotion that 15 patients (30%) suffered, anxiety as the sole was felt by 7 (14%), for 2 (4%) regret was the sensation and 10 patients (20%) didn't have any issue.

Conclusions: The conclusion of this research depicted that majority of the patients were in dark with relation to the knowledge and perception of MRI. It is crucial to explain to the patients about the contraindications and rules regarding the MRI scan.

Keywords: MRI safety, Patient knowledge, Patient perception

INTRODUCTION

Magnetic resonance imaging (MRI) is broadly non-invasive imaging technique that uses a heavy magnetic field, radiofrequency waves, and a computer to diagnostic imaging tool that provides detailed images of the body's soft tissue contrast internal structures.¹

In the ACR guidance document on MR safe practices from 2013 four different zones are suggested from one place to another the MRI scanner.

Zone I: It includes all areas freely reachable to the general public where the magnet field, poses no threats, such as the entrance to the MR department. Zone II: Patients are under general supervision of MR personnel. Zone II often includes the reception area, dressing rooms and MRI screening rooms. Zone III is access-restricted by physical barriers such as doors with coded access.

Inside zone III, only approved MR personnel and patients that have undergone MRI screening is allowed. The MR control room is in zone III.

Zone IV is the room where the magnet is located. Access to Zone IV should only be possible by passing through zone III.² Zone IV is designed so that the walls of magnet room contain the five 0.5 mT line (or 5 Gauss) line of the fringe field of the magnet.³

MRI is usually considered safe, there are potential risks associated with the procedure, such as the use of powerful magnetic fields and radiofrequency waves. Despite the efforts to educate patients about MRI safety, many patients still lack the necessary knowledge and perception of the risks and safety protocols involved in the procedure. The lack of knowledge regarding MRI safety can lead to anxiety, stress, and unnecessary delays in the MRI process.⁴

The perception of MRI safety among patients is a growing concern in the healthcare industry, and numerous studies have been conducted to evaluate patients' understanding of MRI safety. These studies have highlighted the need for more effective communication strategies to enhance patients' knowledge and perception of MRI safety. Moreover, as MRI technology continues to evolve and improve, it is essential to keep patients informed about the latest safety protocols and developments in MRI procedures.⁵

Patients' knowledge and perception of MRI safety are important factors that can affect their decision to undergo the procedure and their compliance with safety guidelines. Therefore, it is essential for healthcare providers to ensure that patients have a clear understanding of the risks and benefits associated with MRI and to provide appropriate information and support to help them make informed decisions about their healthcare.⁶ This article will explore the current state of knowledge regarding MRI safety among patients and the factors that may influence their perception of the risks and benefits of the procedure.

METHODS

Study design

A retrospective cross-sectional questionnaire strategy was used to measure knowledge and perception of MRI safety Among patients

Study area

This research was conducted in radiology department among those patients who came for MRI examination at "Maharishi Markandeshwar institute of medical sciences and research, Mullana, Ambala, Haryana".

Method of data collection

This study was conducted among MRI patients. A questionnaire form was given to the patients at the radiology department of MM Institute of Medical Science

and Research, Maharishi Markandeshwar University, Mullana, Ambala, Haryana, India. The aim of this research was explained to every patient.

Type of study

The study type was an expressive, cross-sectional analysis was done for research reasons.

Duration of study

Study was performed November 2021 to April 2022

Study variables

Demographic according to age, sex, marital status and their knowledge about MRI safety and their perception.

Sample size

Total 50 number of MRI patients took part in this study.

Inclusion criteria

All the interested volunteers who referred for the MRI scan examination are included in the study.

Exclusion criteria

All those patients who are not interested and unavailable (pediatrics) people are excluded from the study.

Statistical analysis

The data collected was compiled, tabulated, graphical, analysed, and subjected to statistical tests. Analysis was done using Excel.

Ethical approval

The study was approved by the institutional ethics committee.

RESULTS

Demographic data, in this survey there were eight age group (Table 1). The first age group was >20 years which included 2 (4%), second group 21-30 years 9 patients (18%), third 31-40 years, 15 patients (30%), forth group 41-50 years 8 patients (16%), fifth age group 51-60 years, 6 patients (12%), sixth group 61-70 years 8 patients (16%), 7th and 8th age groups 71-80 years and 81-90 years, consist of 1 patient each (2% in each group).

The gender ratio allocated in two groups. First group was female consisting of 23 (46%) and second group male consisting of 27 (54%) number of patients with different age group. Table 2 represents the gender ratio, number of patient and the percentage of answer.

A question was asked to patients “how to prepare yourself before MRI procedure?”, 29 patients (58%) answered yes and 21 patients (42%) chose option “no” (Figure 1).

Only 4 patients (8%) knew about the MRI magnetic zone and Majority of patients (92%) didn’t know about the MRI zones (Figure 2).

Out of 50 patients only 14 patients (28%) responded that they knew why jewellery is not allowed in the MRI examination room and 36 patients (72%) responded that they didn’t know (Figure 3).

Patients were asked that for pregnant patients MRI is safe or not, out of 50 patients 21 patients believed that its safe while 17 patients (34%) believed that MRI is not, and 12 patients chose option don’t know (Figure 4).

Nearly, 22% said that MRI is possible with cardiac pacemaker implant, 30% patients said that it’s not possible while 48% didn’t know (Figure 5).

Response of the question MRI will diagnose or treat diseases, patients responded “MRI diagnoses the diseases” were 38 patients (76%). No one selected option “treat” and 10 patients out of 50 selected option “diagnose and treat” and the percentage of those patients were 20% of total patients. And 2 patients out of 50 patients (4%) checked “don’t know” (Figure 6).

Noise production during MRI scan made 46 patients (92%) uncomfortable and 4(8%) patients didn’t have any issue (Figure 7).

In response to question regarding how patients felt before MRI scan, 8(16%) patients felt panic, 5 (10%) sensed fear and panic, 3 (6%) patients fear and anxiety, fear was the emotion that 15 patients (30%) suffered, anxiety as the sole was felt by 7 (14%), for 2 (4%) regret was the sensation and 10 patients (20%) didn’t have any issue (Figure 8).

Patients were asked that how they felt and there was a 1 (2%) patient out of 50 patients who felt panic, uncomfortable and anxiety (all of them) during MRI examination. He selected three options. Four patients (8%) selected two options, these were “uncomfortable” and “anxiety”. Patients who felt uncomfortable or selected option “uncomfortable” were 21 (42%) in number). Option anxiety were selected by 5 (10%) patients and patients who felt panic with anxiety during MRI examination selected both option anxiety and panic. There was only a patient who selected both of these options. There were 5(10) patients who panic during long MRI examination time, they selected panic option. At the last patients who selected option comfortable, were 13 out of 50 patients (26%). Figure 9 represent in the graphical view of the patient’s response what they felt during long MRI examination in the form.

Table 1: Age group allocation of patients.

Age group (in years)	N	Percentage (%)
>20	2	4.00
21-30	9	18
31-40	15	30
41-50	8	16
51-60	6	12
61-70	8	16
71-80	1	2
81-90	1	2
Total	50	100

Table 2: Gender ratio of patients

Gender	N	Percentage (%)
Male	27	54
Female	23	46
Total	50	100

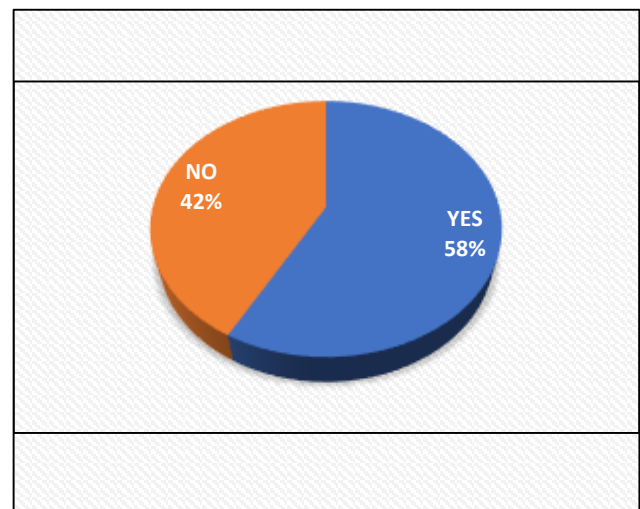


Figure 1: Demographic representation of patient knowledge about prepare yourself before procedure.

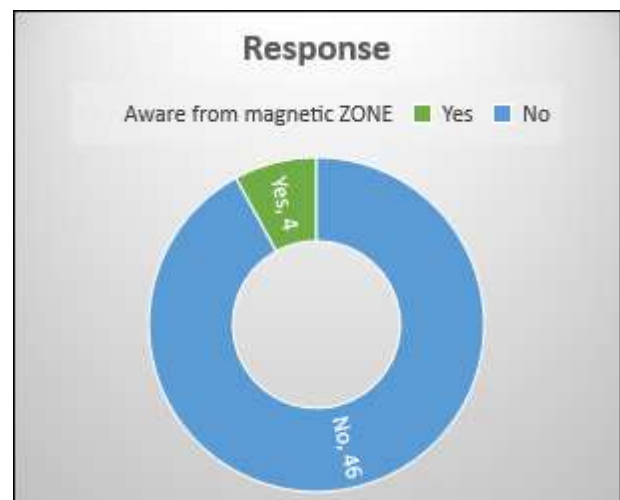


Figure 2: Demographic representation of patients aware from magnetic zone.

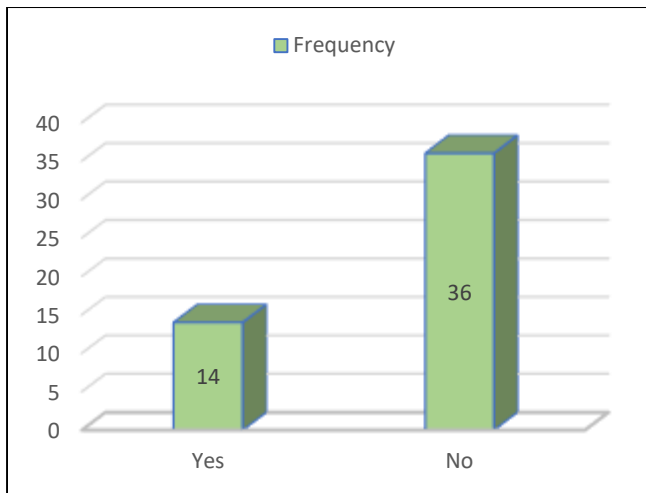


Figure 3: Demographic representation of the patient's knowledge of jewellery is not allowed in MRI.

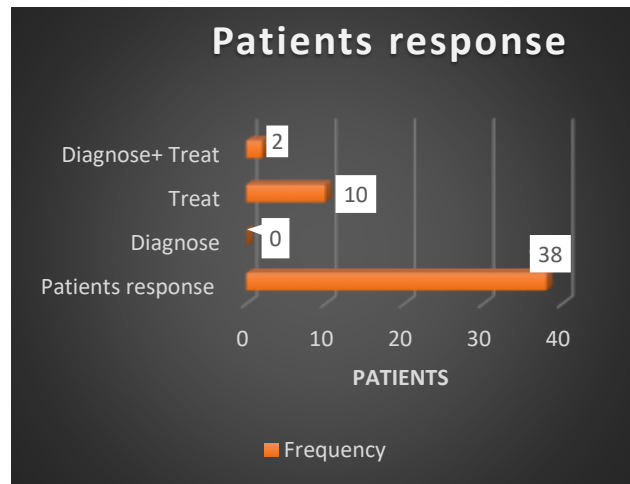


Figure 6: Demographic representation of patient's response, MRI will diagnose or treat.

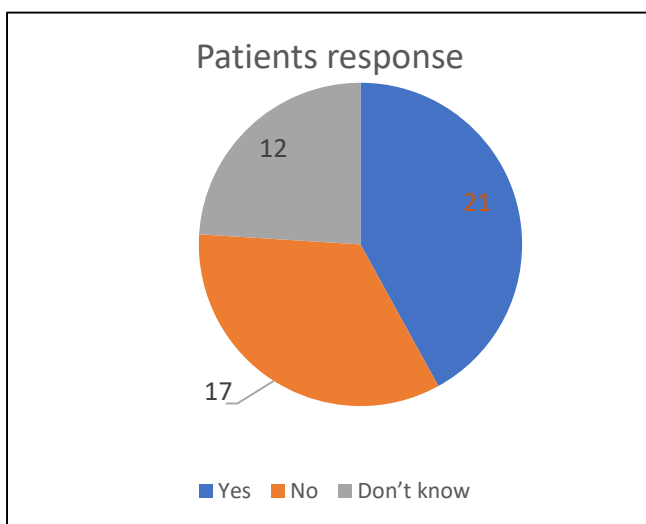


Figure 4: Demographic view of patient's knowledge about MRI is safe for pregnant patient.

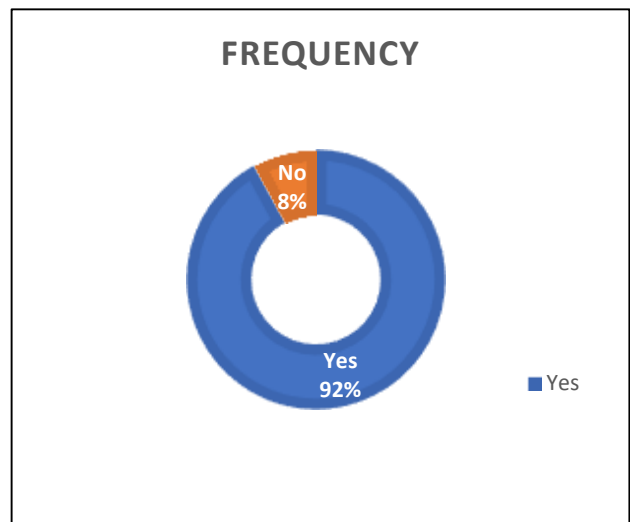


Figure 7: Demographic view of what patients felled by noise produced during MRI scan.

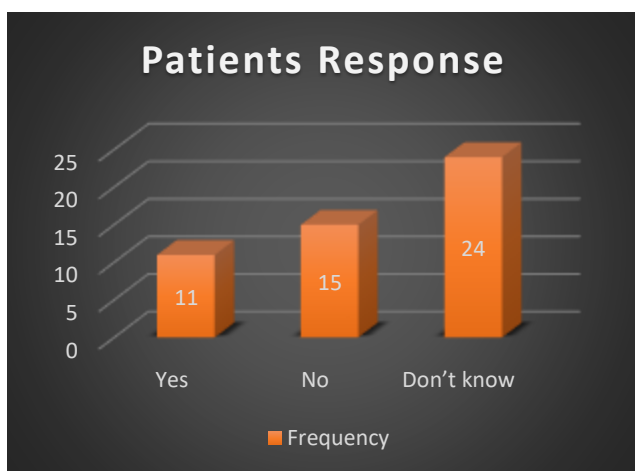


Figure 5: Demographic view of the what patients think MRI is possible with implanted cardiac pacemaker.

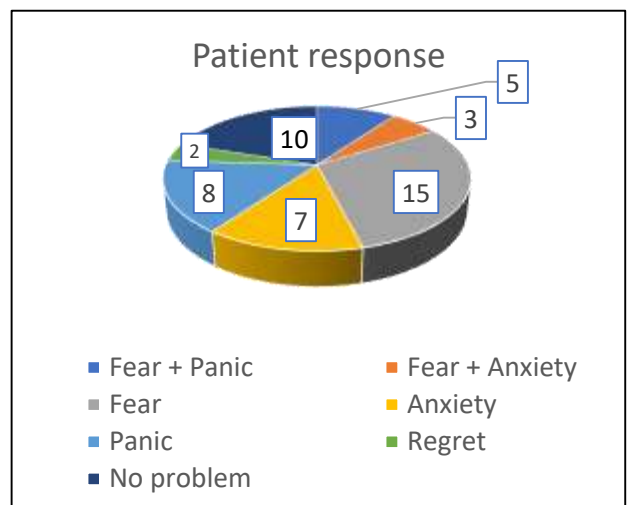


Figure 8: Demographic representation of the patient's response what they feel before MRI.

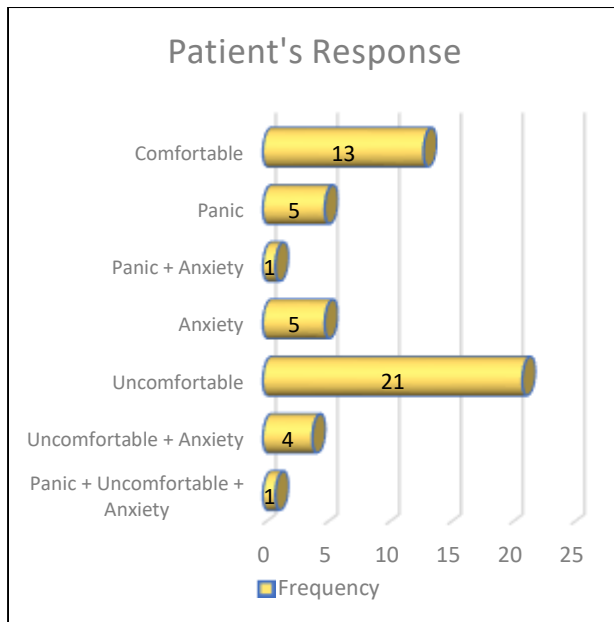


Figure 9: Demographic view of patient's response what they felt during MRI long scan time.

DISCUSSION

In this study to assess their knowledge regarding Total 50 number of patients were included in this study. Out of 50 patients, majority (27, 54%) were male patients while minority of female patients.

In this study around 58% were knew that how to prepare yourself before MRI and rest 42% patients didn't know. The study carried out by Magbool and et al was equivalent to this study. They were found that out of 142 patients, 27 (19%) patients were aware about preparation yourself before MRI while 115 (81%) didn't aware because the literacy rate.⁵

In this study total 8% patients aware from MRI zone that is totally different from the study conducted by Magbool et al that were 70.4% knew about the MRI zone because in their doctor or technician explain them.⁵

In this study around 42% responded that MRI is safe for pregnant women while 17 responded it's not and rest patients didn't answer but, in the study, conducted by Magbool and et al only 19.7% said that MRI is safe rest patients said it's not.⁵ The results are similar to the study conducted by Shrestha et al.⁹ that were 7.7% patients thought that MRI is safe for pregnant women and while 88.1% patients thought didn't safe.⁴ Results also same to the study conducted by S. Asante et al that 57% patients responded its safe while 32.5% stated it was whilst and rest 10.5% didn't have idea regarding this.⁷

Limitations

The study is limited by its sample size, as there are only 50 participants as patients. If there had been more

participants, the result might have varied a little. As the participants included patients, their diagnosis and suffering from illness. This limited the study. The study pool included only MRI patients, and their lack of hospital experience results in the responses being less accurate. Some of the patients not interested. This limited the study.

CONCLUSION

Around 58% patients claimed they knew that how to prepare themselves before MRI procedure. The patients who knew about it may have sufficient knowledge regarding this or may have previously MRI scan and those who didn't know about it didn't have sufficient knowledge. MRI is not a routine examination, so patients usually didn't know about it.

Only 4 patients (8% of total patients) claimed that they knew about the MRI magnetic zone, maybe because they were hospital staff or doctor radiology worker. And 46 patients (92% of total patients) out of 50 patients marked “No”, they didn’t know about MRI zone. In the hospital most of the patients ignore the precaution board. Radiology is not a part of every course.

Around 28% patients stated that they know why jewellery is not allowed in MRI examination room, did they really know why ornaments are not allowed. They may be thought that jewellery is not allowed because its rule of hospital. And 72% patients didn't know why jewellery is not allowed in MRI room, may they didn't know what the basic of MRI is and how the MRI work.

Around 42% patients believed that MRI is safe for pregnant patients because they and their family may have had previously MRI examination during pregnancy. And 34% patients said that for the pregnant women MRI is not safe because they may be male patients or didn't listen about it or nobody explain to him/her. Rest 24% patients not answered this question or may be don't know the about it they may be feel shy if they will wrong.

In the response of cardiac pacemaker implanted patients are eligible for the MRI, only 22% patients said yes because out of 50 patients may implanted new cardiac pacemaker or some had listened from the health workers about it. And 30% patients said that MRI is not possible, may they or their relative have implanted old cardiac pacemaker. Rest 48% didn't know about it or didn't answer or this question

Majority number of patients 76% knew that MRI examination is used for diagnose of the disease because his consultant doctor prescribed the exam explained about the MRI while 20% think that MRI is used for diagnose or treat the disease, may they didn't listen to his doctor or may be at that time doctor has come with the patients and just perform the examination with the consent of patient and rest 4% patients didn't answer the

question they may be punctual to his doctor, just doctor said them to perform the examination.

Noise producing during MRI makes 92% patients uncomfortable because MRI machine produce hammer like sound and it's a heavy sound. Only 8% patients felt comfortable they may be loud hearers or may not be affected by heavy sound.

For the perception of patients, a question was asked that how they felt before MRI and 30% of total patients selected fear as their option that means they felt scared before the MRI examination maybe because it was their first time in MRI and their preparation before scan was lengthy and consisting of many questions and it mase them fear about the procedure that it is a complex scan. Around 14% of total patients selected anxiety as option because they might have heard previously that it is a very time consuming and noisy scan and patient should not move and so they were feeling anxiety before the MRI examination. Nearby 4% of total patients felt regret before the examination as they thought they would not able to go through the scan easily or something might happen to them. Lastly, 20% of total patients out of 50 patients checked "no problem" as option as they didn't have any problem during MRI examination maybe because they have an understanding of the process.

MRI is a long-time procedure, many patients can feel bore and anxious during scan time, patients were asked that how they felt, majority of patients and that is 42%, felt uncomfortable during procedure because it is very difficult to remain still for long time in a congested place and also the loud noises can be unbearable. Approximately 26% felt comfortable during scan maybe because they were used to lie still for long hours in a loud environment or they have had MRI scans done before. Rest 32% of patients selected different variations of responses like uncomfortable and anxiety, anxiety only and both panic and anxiety maybe because they were claustrophobic and felt a sense of danger from bulky and loud machine. And also, because they have certain mental or physical medical conditions that didn't allow them to lie in a fixed position for long duration

The conclusion of this research depicted that majority of the patients were in dark with relation to the knowledge and perception of MRI. It is crucial to explain to the patients about the contraindications and rules regarding the MRI scan.

ACKNOWLEDGEMENTS

Authors would like to thank assistant professor and RSO, and Mr. Kripanand Yadav, assistant professor, department of radiology, M.M.I.M.S.R. Mullana, Ambala.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Sharma SK, Singh S. Knowledge and perception of magnetic resonance imaging safety among patients. *Int J Res Med Sci* 2023;11:4088-94.