Assessment of Patient Knowledge and Perception Regarding Magnetic Resonance Imaging Safety at a Tertiary Care Center

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***Abstract*—Magnetic Resonance Imaging (MRI) is a critical diagnostic tool, yet its effectiveness often depends on patient compliance and understanding of safety protocols. This study evaluates the knowledge and perceptions of 125 patients regarding MRI safety at a tertiary care center in Moradabad. Findings reveal significant gaps in patient knowledge, particularly among illiterate populations, regarding the nature of MRI, the use of radio waves, and safety contraindications. The results underscore the need for enhanced patient education to improve safety outcomes and clinical workflow.**

***Index Terms*—Magnetic Resonance Imaging, Patient Knowledge,MRI Safety**

I. INTRODUCTION

Magnetic Resonance Imaging (MRI) is a modern detection method essential for diagnosing systemic and focal disorders. While highly effective for imaging soft tissues, bone, and neural structures, MRI environments pose unique risks due to intense magnetic fields and radiofrequency (RF) energy.
Standardized safety protocols, such as those established by the American College of Radiology (ACR), are vital to prevent accidents related to ferromagnetic objects and implanted devices. However, patient understanding is a prerequisite for safety and optimal scan utilization. Lack of knowledge can lead to anxiety, claustrophobia, and movement artifacts, which negatively impact image quality and departmental efficiency. The focus of this research is to evaluate how well patients understand and perceive the safety protocols and risks associated with MRI scans.

II. METHODOLOGY

- Study Design: A prospective questionnaire-based study.
- Study Setting: Tertiary care centre, Moradabad.
- Study Duration: March 2021 to March 2022.
- Participants: 125 OPD patients were selected using a probability sampling strategy.
- Inclusion/Exclusion Criteria: Included all OPD patients; excluded IPD, psychiatric, trauma, and paediatric patients.
- Data Collection: A four-part questionnaire covering socio-demographics, knowledge of MRI safety, and perceptions before and after the scan.
- Analysis: Data was tabulated and analysed using Google Forms and statistical tests.

III. RESULTS

3.1 Socio-Demographic Profile

The study included 125 participants, with the most frequent age group being 30–39 years (30.4%). Females represented 55.2% of the cohort. Education levels varied significantly, with 34.4% being illiterate and 24% being graduates.

Table 1: Socio-Demographic Distribution

Variable	Category	Frequency	Percentage (%)
Age	20-29	12	9.6

	30-39	38	30.4
	40-49	30	24.0
	50-89	45	36.0
Gender	Male	56	44.8
	Female	69	55.2
Education	Illiterate	43	34.4
	Matriculation	15	12.0
	Graduate	30	24.0
	Post Graduate	15	12.0

3.2 Knowledge and Safety Awareness
Knowledge regarding MRI mechanics and safety was notably low. Over 60% of patients could not define an MRI, and a vast majority (92%) were unaware of MRI safety zones.

Table 2: Knowledge of MRI Safety

Question	Correct Response	Frequency	%
What is MRI?	MR Imaging	12	9.6
Use of Radio Waves?	Yes	7	5.6
Aware of MRI Zones?	Yes	10	8.0
Aware of Contraindications?	Yes (ATM/Pacemaker)	40	32.0
Compatible Devices?	Yes	16	12.8

3.3 Patient Perception (Before vs. After Scan)
Initial anxiety was high (63.2%), but the fear increased to 75.2% during the procedure, primarily attributed to the noise of the scanner.

Table 3: Patient Perception Analysis

Question	Response	Frequency	%
Before Scan: Scared?	Yes	79	63.2
Before Scan: Aware of noise?	Yes	5	4.0
After Scan: Scared during?	Yes	94	75.2
Cause of Fear:	Noise	66	52.8
Post-scan Help:	Tech Explanation	125	100.0

3.4 Impact of Education on Knowledge
A significant correlation was found between education level and technical knowledge.

Table 4: Knowledge Scores by Education

Education Level	"Do Not Know" what MRI is	Awareness of Zones (No)
Illiterate	100%	100%
Graduate	30%	86.7%
Post Graduate	13.3%	73.3%

IV. DISCUSSION

This study demonstrates a statistically significant association ($p < 0.001$) between educational background and the understanding of MRI safety. A major concern is the "Radiation Myth," where 21.6% of patients believed MRI involves ionizing radiation. This misconception can lead to unnecessary refusal of scans or patient distress.

Furthermore, the lack of awareness regarding safety zones (92%) highlights a potential risk for the "missile effect," where ferromagnetic objects are introduced into the magnetic field. Interestingly, while illiterate patients lacked technical knowledge, more educated patients reported higher levels of procedural fear, possibly due to a deeper awareness of clinical environments.

V. CONCLUSION

Patient knowledge regarding MRI safety is insufficient, particularly among those with lower education levels. This gap leads to increased anxiety and potential safety risks. Improving patient education through visual aids, simplified consent forms, and thorough technologist communication is vital for clinical safety and efficiency.

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