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## **A Study to Access the Anxiety Levels of the Patients Undergoing Magnetic Resonance Imaging at Selected Hospitals Bengaluru with a View to Develop an Information Booklet**

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### **Abstract**

Magnetic Resonance Imaging (MRI) is a widely used diagnostic procedure that, while safe and effective, often induces anxiety in patients due to its enclosed environment, loud noises, and unfamiliarity. This study was undertaken to assess the anxiety levels of patients undergoing MRI at selected hospitals in Bengaluru, with the aim of developing an information booklet to support anxiety reduction. A descriptive non-experimental design was adopted, and 50 patients were selected through convenience sampling. Data were collected using a structured interview schedule and an anxiety rating scale. Results revealed that the majority of patients (58%) experienced moderate anxiety, followed by 30% with mild anxiety, and 12% with severe anxiety. The overall mean anxiety score was 31.46 (41.94%), indicating a moderate level of anxiety among participants. Statistical analysis showed that previous experience with MRI and the source of information about the procedure were significantly associated with anxiety levels, while demographic factors such as age, gender, education, and occupation had no significant association. The findings emphasize the importance of pre-procedure education, reassurance, and coping strategies to help patients manage anxiety. Based on the results, an information booklet was developed to enhance patient preparedness and cooperation during MRI procedures. The study concludes that structured education and supportive nursing interventions play a crucial role in alleviating MRI-related anxiety, ultimately improving diagnostic outcomes and patient well-being.

### **Introduction**

Magnetic Resonance Imaging (MRI) is an advanced diagnostic technique that uses strong magnetic and electromagnetic fields along with radiofrequency waves to produce detailed images of the human body [1]. Unlike X-rays or CT scans, MRI does not involve ionizing radiation, making it a safer option for repeated use [2]. In the scanner, hydrogen nuclei within the body

align with the magnetic field, and when stimulated by radiofrequency pulses, they emit signals that are converted into high-resolution images. This process enables clear differentiation between vascular and non-vascular structures, making MRI a valuable tool in medical diagnosis [1].

The development of MRI has a rich history, beginning with Herman Carr's first one-dimensional image in

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### **Keywords:**

Magnetic Resonance Imaging (MRI), Anxiety, Patient Education, Nursing Intervention, Information Booklet, Coping Strategies, Diagnostic Imaging.



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1952, followed by Raymond Damadian's invention of the first MRI machine in 1972. Later, Paul Lauterbur and Sir Peter Mansfield contributed significantly to its advancement and were awarded the Nobel Prize in 2003 [2].

Currently, MRI is widely used to detect tumors, bleeding, injuries, infections, and other abnormalities in the brain, chest, abdomen, pelvis, bones, and joints. Most clinical MRI systems operate at 1.5 Tesla, while open MRI scanners with lower field strength are available for patients with claustrophobia [2]. Thus, MRI remains an indispensable, non-invasive tool in modern healthcare [1].

### Study Purpose

Magnetic Resonance Imaging (MRI) is a widely used diagnostic tool that produces detailed images of organs and tissues using strong magnetic fields and radio waves, without exposing patients to harmful radiation. It is particularly valuable in detecting abnormalities, including cerebral changes, at an early stage. During the procedure, patients may feel anxious due to the confined space, loud noises, or lack of awareness about the process. Nurses play a key role in preparing patients by providing relaxation techniques, orientation, and ensuring safety by removing metallic objects. However, many patients still experience significant anxiety, which can interfere with cooperation during the scan. Studies show that nearly one-third of patients undergoing MRI report moderate to severe anxiety, which affects their physical and psychological well-being. Therapeutic interventions such as guided imagery have been effective in reducing movement and anxiety. Therefore, assessing and addressing patient anxiety is crucial to ensure successful MRI procedures.

### Objectives of the Study

1. To assess the level of anxiety of patients undergoing Magnetic Resonance Imaging.
2. To find out the association between the level of anxiety and selected demographic variables.
3. To develop an information booklet based on the knowledge regarding anxiety levels of patients undergoing MRI.

### Hypothesis

- **H<sub>0</sub>:** There will be a no significant association between knowledge and selected demographic variables.
- **H<sub>1</sub>:** There will be a significant association between knowledge and selected demographic variables.

### Materials and Methods

#### Research Design

Research design is a blue print to conduct a study that maximizes control factors that could interfere with study's desired outcome. Type of design directs the selection of a population, sampling procedure, data collection and plan for data analysis. The choice of

research design depends upon the researcher's expertise the problem and the purpose of the study and desire to generalize the findings. After considering the entire factors related to the selected problem, the investigator has selected non experimental study design. Anxiety scale helps to assess the anxiety of patients undergoing magnetic resonance imaging. The research design was represented diagrammatically.

#### Research Settings

The setting is the location where a study is conducted. The study was conducted in selected Hospitals Bengaluru. The setting is selected because of availability of the samples, feasibility of conducting study and geographical proximity.

#### Target Population

The population referred to the target population, which represents the entire group or all the elements individuals or objects that meet certain criteria for inclusion in the study. In the present study the population refers to the patients who are undergoing magnetic resonance imaging at selected hospitals of Bengaluru.

#### Sampling Technique

Sample refers to subject of the population i.e. selected to participate in a research study. In the present study, the sample consists of 50 patients who are undergoing magnetic resonance imaging at selected hospitals of Bengaluru who full fill the inclusion criteria of the study. Sampling refers to the process of selecting a group of people or in order elements with which to conduct a study. In this study non-probability convenience sampling was adopted to draw the sample and to reduce bias.

#### Inclusion Criteria

The study includes the patients who are:

- Undergoing MRI scanning at Shiva Venkateshwara Multi Speciality hospital in Bengaluru.
- Willing to Participate in the study
- Available at the time of data collection

#### Exclusion criteria:

The study excludes the patients who are not:

- Undergoing MRI scanning in Shiva Venkateshwara Multi Speciality hospitals.
- Willing to participate in the study
- Available at time of data collection

#### Ethical Consideration

Ethical clearance has been obtained from:

- The institutional ethical committee of Acharya College of Nursing.
- Permission obtained from selected hospitals at Bengaluru.
- Consent was obtained from all the subjects.

#### Data Analysis

Data analysis is the systematic organization and synthesis of research data, the testing of the research hypotheses by using the obtained data. It is planned to

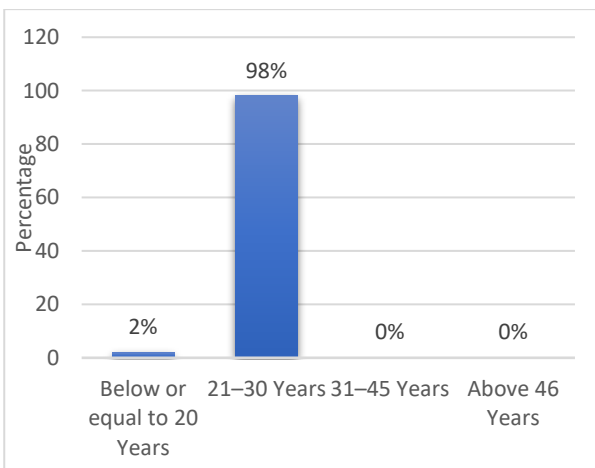
analyze and interpret data with the help of descriptive and inferential statistics. The following methods are planned to analyze the data.

**Results**

**Distribution of subjects according to socio-demographic variables using frequency and percentage**

**Table 1: Distribution of Subjects According to Age in Years (N=50)**

Age in Years	Frequency (f)	Percentage (%)
Below or equal to 20 Years	1	2
21–30 Years	49	98
31–45 Years	0	0
Above 46 Years	0	0
<b>Total</b>	<b>50</b>	<b>100</b>

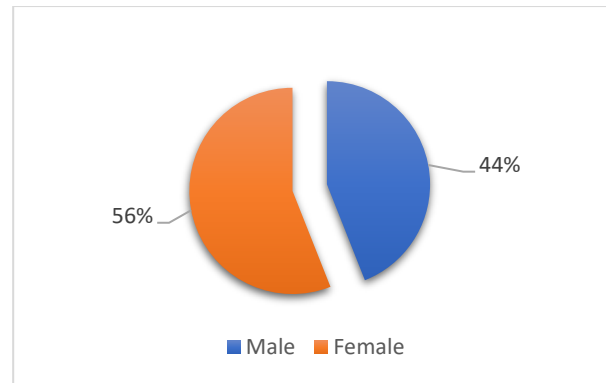


**Figure 1: Distribution of Subjects According to Age in Years**

**Table 1** illustrates the distribution of subjects according to their age. Out of the total 50 participants, the vast majority—**49 subjects (98%)**—belonged to the **21–30 years** age group. Only **1 subject (2%)** was aged **20 years or below**, while there were **no participants in the 31–45 years or above 46 years** categories. This indicates that the sample was predominantly composed of young adults, which could influence factors such as anxiety perception, familiarity with technology, and adaptability to medical procedures like MRI.

**Table 2: Distribution of Subjects According to Gender (N=50)**

Gender	Frequency (f)	Percentage (%)
Male	22	44
Female	28	56
<b>Total</b>	<b>50</b>	<b>100</b>

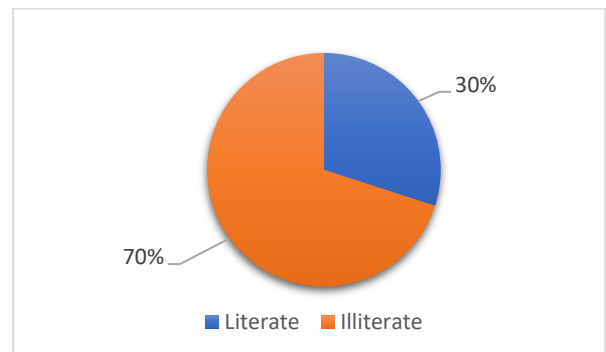


**Figure 2: Distribution of Subjects According to Gender**

**Table 2** illustrates the distribution of patients undergoing MRI based on their gender. Out of the total 50 respondents, **28 participants (56%)** were **female**, while **22 participants (44%)** were **male**. This indicates a slightly higher representation of female patients in the study compared to males.

**Table 3: Distribution of Subjects According to Education Status (N=50)**

Education Status	Frequency (f)	Percentage (%)
Literate	15	30
Illiterate	35	70
<b>Total</b>	<b>50</b>	<b>100</b>

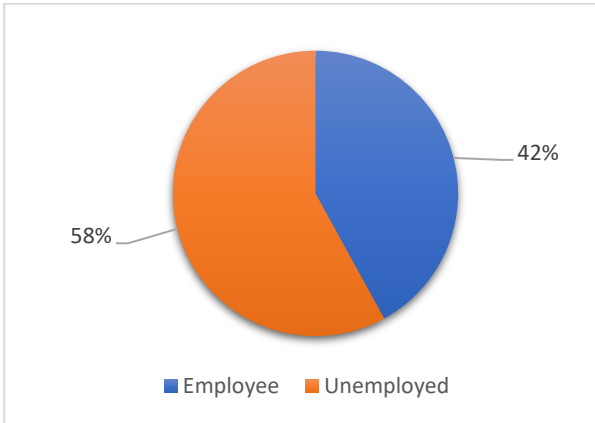


**Figure 3: Distribution of Subjects According to Education Status**

**Table 3** illustrates the distribution of patients undergoing MRI based on their educational status. Out of the total 50 respondents, the majority of participants (**35, 70%**) were **illiterate**, while **15 participants (30%)** were **literate**. This indicates that a significant proportion of the study population lacked formal education, which may influence their understanding and anxiety related to MRI procedures.

**Table 4. Distribution of Subjects According to Occupation (N=50)**

Occupation	Frequency (f)	Percentage (%)
Employee	21	42
Unemployed	29	58
<b>Total</b>	<b>50</b>	<b>100</b>

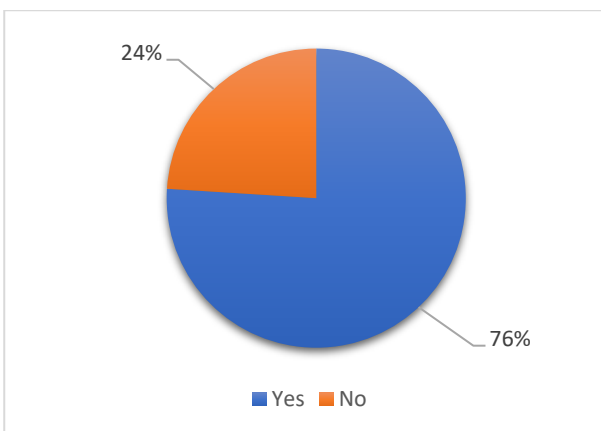


**Figure 4: Distribution of Subjects According to Occupation**

**Table 4** illustrates the distribution of patients undergoing MRI based on their occupational status. Out of the total 50 respondents, **29 participants (58%)** were **unemployed**, while **21 participants (42%)** were **employed**. This indicates that a larger proportion of the study population was not engaged in formal employment at the time of data collection.

**Table 5: Distribution of Subjects According to Previous Experience with MRI (N=50)**

Previous experience with MRI	Frequency (f)	Percentage (%)
Yes	38	76
No	12	24
<b>Total</b>	<b>50</b>	<b>100</b>

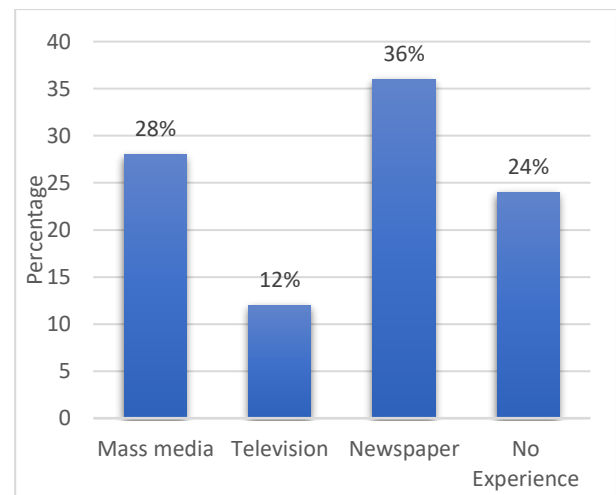


**Figure 5: Distribution of Subjects According to Previous Experience with MRI**

**Table 5** illustrates the distribution of patients based on their previous experience with MRI. Out of the total 50 respondents, the majority of participants (**38, 76%**) reported having **previous experience** with undergoing an MRI scan, while **12 participants (24%)** had **no prior experience**. This indicates that most of the subjects were familiar with the MRI procedure, which could influence their level of anxiety.

**Table 6: Distribution of Subjects According to Source of Information about MRI (N=50)**

Source of Information about MRI	Frequency (f)	Percentage (%)
Mass media	14	28
Television	6	12
Newspaper	18	36
No Experience	12	24
<b>Total</b>	<b>50</b>	<b>100</b>



**Figure 6: Distribution of Subjects According to Source of Information about MRI**

**Table 6** illustrates the distribution of subjects according to their source of information about MRI. Out of the total 50 respondents, the highest number of participants (18, 36%) reported newspapers as their primary source of information, followed by 14 participants (28%) who received information through mass media. Additionally, 6 participants (12%) cited television as their source, while 12 participants (24%) had no prior exposure to any information about MRI. This indicates that while a majority of the subjects had some awareness about MRI from various sources, a notable proportion remained uninformed, which may affect their perception and anxiety levels related to the procedure.

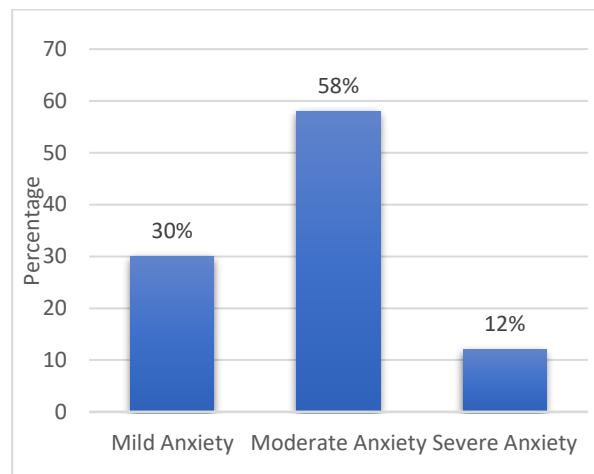
**Assessment of anxiety levels among patients undergoing Magnetic Resonance Imaging using frequency and percentage**

**Table 7: Criteria Wise Assessment of Anxiety Levels Among Patients Undergoing Magnetic Resonance Imaging Using Frequency and Percentage (N=50)**

Level of anxiety	Score	Frequency (f)	Percentage (%)
Mild Anxiety	0-25	15	30
Moderate Anxiety	26-50	29	58
Severe Anxiety	51-75	6	12
<b>Total</b>	<b>75</b>	<b>50</b>	<b>100</b>

Table 7 illustrates the criteria-wise distribution of anxiety levels among patients undergoing Magnetic Resonance Imaging (MRI). Out of the total 50 subjects, the majority of participants (29, 58%) experienced moderate anxiety, followed by 15 participants (30%) who reported mild anxiety. A smaller proportion, 6

participants (12%), experienced severe anxiety. These findings suggest that most patients undergoing MRI tend to have moderate anxiety, emphasizing the importance of implementing anxiety-reducing interventions before the procedure.



**Figure 7. Criteria Wise Assessment of Anxiety Levels Among Patients Undergoing Magnetic Resonance Imaging Using Frequency and Percentage**

**Table 8. Criteria Wise Assessment of Anxiety Levels Among Patients Undergoing Magnetic Resonance Imaging Using Mean, Mean%, SD & CV (N=50)**

Level of anxiety	Mean	Mean %	SD	CV
Mild Anxiety	23.73	31.64	1.289	0.05
Moderate Anxiety	30.86	41.14	2.921	0.09
Severe Anxiety	53.66	71.54	1.598	0.02

**Table 8** presents the criteria-wise assessment of anxiety levels among patients undergoing Magnetic Resonance Imaging (MRI), analyzed using Mean, Mean Percentage, Standard Deviation (SD), and Coefficient of Variation (CV). The **mean anxiety score** was highest among the **severe anxiety group (53.66, 71.54%)**, followed by the **moderate anxiety group (30.86, 41.14%)**, and the **mild anxiety group (23.73, 31.64%)**. In terms of variability, the **moderate anxiety group** showed the highest **SD (2.921)** and **CV (0.09)**, indicating greater dispersion in scores. Conversely, the **severe anxiety group** had the

lowest CV (0.02), suggesting consistency in high anxiety levels among those classified as severely anxious. These findings indicate a trend of increasing anxiety intensity with lower variability in the severe group, underscoring the need for targeted psychological support for such patients.

**Analysis of overall anxiety levels among patients undergoing Magnetic Resonance Imaging using Mean, Standard Deviation (SD), and Coefficient of Variation (CV)**

**Table 9. Overall Analysis of Overall Anxiety Levels Among Patients Undergoing Magnetic Resonance Imaging Using Mean, Standard Deviation (SD), and Coefficient Of Variation (CV) (N=50)**

Criteria	Score	Mean	Mean %	S.D.	C.V.
Anxiety	1573/3750	31.46	41.94	9.113	0.28

**Table 9**, provides the overall analysis of anxiety levels among patients undergoing Magnetic Resonance Imaging (MRI), based on statistical measures such as Mean, Mean Percentage, Standard Deviation (SD), and Coefficient of Variation (CV). The **mean anxiety score** was **31.46**, which corresponds to a **mean percentage of 41.94%**, indicating a moderate level of anxiety on

average among the 50 participants. The **standard deviation** was **9.113**, reflecting some degree of variation in anxiety scores, while the **coefficient of variation (0.28)** suggests a moderate level of relative variability in the anxiety responses. These findings emphasize the presence of varied anxiety levels among

patients, underscoring the importance of individualized patient support during MRI procedures.

**Chi-square analysis to determine the association between the levels of anxiety with selected socio-demographic variables among patients undergoing Magnetic Resonance Imaging**

**Table 10. Chi-Square Analysis to Determine the Association Between the Levels of Anxiety With Selected Socio-Demographic Variables (N=50)**

Sl. No.	Sample characteristics	Mid	Moderate	Severe	Calculated chi-square Test value	df	Table value 0.05	Inference
<b>1.</b>	<b>Age in Years</b>							
a)	Below or equal to 20	1	0	0	<b>2.380</b>	<b>2</b>	<b>5.991</b>	<b>Not Significant</b>
b)	21–30	14	29	6				
c)	31–45	0	0	0				
d)	Above 46	0	0	0				
<b>2.</b>	<b>Gender</b>							
a)	Male	9	10	3	<b>2.712</b>	<b>2</b>	<b>5.991</b>	<b>Not Significant</b>
b)	Female	6	19	3				
<b>3.</b>	<b>Educational Status</b>							
a)	Literate	7	6	2	<b>3.212</b>	<b>2</b>	<b>5.991</b>	<b>Not Significant</b>
b)	Illiterate	8	23	4				
<b>4.</b>	<b>Occupation</b>							
a)	Employee	5	12	1	<b>1.383</b>	<b>2</b>	<b>5.991</b>	<b>Not Significant</b>
b)	Unemployed	10	17	5				
<b>5.</b>	<b>Previous Experience with MRI</b>							
a)	Yes	12	24	2	<b>6.846</b>	<b>2</b>	<b>5.991</b>	<b>Significant</b>
b)	No	3	5	4				
<b>6.</b>	<b>Source of Information About MRI</b>							
a)	Mass media	6	7	1	<b>13.160</b>	<b>6</b>	<b>12.592</b>	<b>Significant</b>
b)	Television	3	2	1				
c)	Newspaper	3	15	0				
d)	No Experience	3	5	4				

Table 10 presents the results of the Chi-square test conducted to assess the association between the levels of anxiety and selected socio-demographic variables among patients undergoing Magnetic Resonance Imaging (MRI).

- **Age:** The calculated Chi-square value was 2.380 with 2 degrees of freedom (df), which is less than the table value of 5.991 at the 0.05 level of significance. Hence, there was no significant association between age and anxiety levels.
- **Gender:** The Chi-square value was 2.712 (df = 2), which is also less than the table value of 5.991, indicating no significant association between gender and anxiety levels.
- **Educational Status:** The calculated value was 3.212 with 2 df, which is less than the table value of 5.991, showing no significant association between educational status and anxiety levels.
- **Occupation:** The Chi-square value was 1.383 (df = 2), below the table value of 5.991, thus there was

no significant association between occupation and anxiety levels.

- **Previous Experience with MRI:** The Chi-square value was 6.846 with 2 df, which is greater than the table value of 5.991. Therefore, a statistically significant association was found between previous MRI experience and anxiety levels, indicating that prior exposure to MRI may influence anxiety.
- **Source of Information about MRI:** The calculated Chi-square value was 13.160 with 6 df, which is greater than the table value of 12.592, indicating a statistically significant association between source of information and anxiety levels. This suggests that the way patients receive information about MRI can impact their anxiety. Among all the selected socio-demographic variables, previous experience with MRI and source of information about MRI showed a statistically significant association with anxiety levels. Other variables—age, gender, educational status, and occupation—were

found to have no significant association with the level of anxiety among patients undergoing MRI.

### Discussion

The present study assessed anxiety among patients undergoing MRI at selected hospitals in Bengaluru, revealing that 58% experienced moderate anxiety, 30% mild anxiety, and 12% severe anxiety, with an overall mean score indicating moderate levels. These findings are consistent with earlier studies that identified MRI as a stressful diagnostic test due to the enclosed environment, loud machine noises, and lengthy procedure [4,7,10]. Importantly, patients with previous MRI experience and those who obtained information from reliable sources such as healthcare providers or newspapers reported significantly lower anxiety. This supports prior evidence suggesting that familiarity with the procedure reduces fear, while lack of knowledge intensifies it [6,7]. Demographic variables such as age, gender, education, and occupation were not significantly linked to anxiety, reinforcing the situational nature of this response [10]. The study highlights the need for effective pre-procedure counseling, health education, and supportive communication to reduce anxiety and improve patient cooperation during MRI [8,9].

### Conclusion

The present study concludes that patients undergoing MRI commonly experience moderate levels of anxiety, with a smaller proportion experiencing severe anxiety. Anxiety was significantly associated with patients' prior exposure to MRI and the source of information they received. Those who had no previous MRI experience or had inadequate information were more anxious than their counterparts.

The study emphasizes the critical role of nurses and healthcare professionals in preparing patients for MRI by offering clear instructions, relaxation techniques, and supportive communication. Educating patients through information booklets and verbal counseling can substantially reduce their anxiety, improve cooperation, and lead to better diagnostic outcomes. Thus, strengthening patient education and psychological support should be considered an essential component of MRI preparation in hospitals.

### Recommendations

Future studies may be conducted with larger samples and diverse settings to strengthen generalizability. Comparative and experimental designs can evaluate specific interventions such as guided imagery or

relaxation techniques. Incorporating structured patient education, including information booklets, is strongly recommended to reduce anxiety and improve cooperation during MRI procedures.

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### Conflict of Interest

None

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