

# Assessment of Comfort, Anxiety and Patient Experience during 3T MRI at Tertiary Care Hospital

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## ABSTRACT

### Background:

Magnetic resonance imaging (MRI) is a widely used diagnostic modality, but it is often associated with patient anxiety and discomfort due to factors such as noise, confined space, and scan duration. These factors can negatively affect patient cooperation and image quality.

### Objective:

To assess comfort levels, anxiety, and patient experiences during 3T MRI examinations by using questionnaire. To correlate patient comfort, anxiety and experience through demographic factors.

### Methods:

This cross-sectional study included 116 patients undergoing 3T MRI at a tertiary care hospital. Patient comfort, anxiety, and overall experience were assessed using a structured and validated questionnaire, along with the collection of relevant demographic and clinical data.

### Results:

The mean age of participants was  $41.9 \pm 12.7$  years, with a nearly equal gender distribution. A majority of patients (60.3%) reported a good overall MRI experience, while 39.7% reported an average experience. Anxiety levels were significantly higher among patients with lower education, rural residence, and certain occupations ( $p < 0.05$ ), while gender showed no significant association. Comfort scores increased significantly with higher education and were lower among rural and socioeconomically disadvantaged groups ( $p < 0.05$ ). A strong negative correlation was observed between anxiety and comfort ( $r = -0.76$ ,  $p < 0.001$ ), with increasing age and longer scan duration associated with higher anxiety and reduced comfort.

### Conclusion:

Patient anxiety and comfort during 3T MRI are significantly influenced by demographic factors, particularly education, residence, and occupation. Higher anxiety is associated with lower comfort, and both are closely linked to overall patient experience. Targeted interventions such as patient education, anxiety reduction strategies, and improved communication can enhance comfort and optimize the MRI experience.

**Keywords:** Magnetic Resonance Imaging (MRI), Patient Anxiety, Patient Comfort, 3T MRI, Patient Experience

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## Introduction

MRI is a non-invasive method that is widely used in modern medical imaging, that uses strong magnetic fields along with radio frequency waves to produce images of internal organs of the body.<sup>(1)</sup> Although the multiple advantages, the MRI procedure itself poses substantial difficulties for patients.<sup>(2)</sup> The MRI is characterized by its limited space and significant acoustic noise, has likely to cause psychological distress, which may increase patient anxiety and doubt towards the procedure.<sup>(3)</sup> The scanning equipment itself can create anxiety in claustrophobic patients.<sup>(4)</sup> In recent years, many studies highlighted the psychological anxiety experienced during MRI examinations.<sup>(5)</sup> The scanning environment can produce significant levels of anxiety and discomfort, specially in individuals with claustrophobia.<sup>(6)</sup> Elevated levels of anxiety and stress has a negative impact on patient experience.<sup>(7)</sup> Patients undergoing MRI examinations often experience high levels of pre-procedural stress and anxiety due to the unfamiliar surroundings and fear of the procedure.<sup>(8)</sup> Given the high prevalence of anxiety among patients undergoing MRI and the substantial use of this diagnostic technique, it is necessary to develop effective strategies to reduce patients anxiety.<sup>(9)</sup> To reduce anxiety and fear in MRI scanning, several supportive techniques have been employed, such as self hypnosis, MRI guide booklet containing information about the examination procedure and guidance, music based distraction, and guided imagery interventions.<sup>(10)</sup> Supportive devices like MRI compatible goggles, headphones, and audiovisual content can be useful to distract the patient from stressful situation.<sup>(11)</sup> In recent years, Non pharmacological interventions like music and videos are more used in hospitals to reduce stress of individuals.<sup>(12)</sup> Anxiety among patients may results involuntary movement during scan, limiting the ability to stay still and which can necessitate repeat scans, there by extended examination time and greater resource application.<sup>(13)</sup> Advancements in technology, such as open MRI, shorter bore length, and wider bore size can improved patient comfort.<sup>(14)</sup> A lethal and ethical approval is required in written consent before MRI examination, that patient have rights to make decisions of their care.<sup>(15)</sup> Therefore, improvising the psychological effects of patients can lead to better in improving in patients related radiological care.<sup>(16)</sup> Even for children who are undergoing MRI scans can be a tough experience and more scans are done by sedation or anesthesia to secure an effective work flow that provide high resolution diagnostic images.<sup>(17)</sup>

## Material and Methods

**Material:** A cross-sectional prospective study was conducted in the Department of Radiology, NIMS Hospital, Jaipur Rajasthan, over a period of 6 months, in patients who are underwent 3T MRI Examinations.

Data collection was started only when the patient's written informed consent was given.

**Method:** In this study, a self-structured questionnaire were used to measure the patient's anxiety, comfort, and experience. Answers were recorded on a 5-point Likert scale (0-4). Data were collected from patients undergoing 3T MRI examinations at a tertiary care hospital during the study period. The purpose of the study was explained to all participants, and written informed consent was obtained prior to inclusion. A structured questionnaire was used to assess patient anxiety, comfort, and overall experience during the MRI procedure, with anxiety measured using a Likert scale. Demographic details, including age, gender, educational status, and previous MRI experience, were recorded using a data collection form. Participants were asked to complete the questionnaire immediately after the MRI examination. All collected data were systematically entered into a computer database for subsequent statistical analysis.

**Statistical analysis:** Continuous variables were expressed as mean  $\pm$  standard deviation (SD), and categorical variables were presented as frequencies and percentages. Group comparisons were performed using the independent t-test for two groups and one-way analysis of variance (ANOVA) for three or more groups. Pearson correlation and point-biserial correlation were used to assess relationships between variables. A *p*-value of  $<0.05$  was considered statistically significant.

## Results

A total of 116 participants were included in this study. The results are presented in terms of demographic characteristics, clinical variables and outcome measures. The mean age of the participants was  $41.9 \pm 12.7$  years, with a range of 19 to 68 years. The demographic factors such as gender, education, residence, occupation, marital status, body part examined and duration of scan and also clinical characteristics like challenges facing during scanning and over all experience in below Table.

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Basic type	Categories	Frequency(n)	Percentage(%)
Gender	Male	61	52.60%
	Female	55	47.40%
Education	Illiterate	44	37.90%
	Primary	40	34.50%
	Secondary	27	23.30%
	Graduate	5	4.30%
Residence	Rural	107	92.20%
	Urban	9	4.80%
Marital status	Married	108	93.10%
	Single	8	6.90%
Occupation	Farmer	12	10.30%
	Worker	19	16.40%
	House Wife	28	24.10%
	Business	16	13.80%
	Job	18	15.50%
	Study	5	4.30%
Body Part examined	Nothing/Other	18	15.50%
	Spine	38	32.80%
	Brain	32	27.60%
	ABD	9	7.80%
	MSK	10	8.60%
Scan duration	Other*	27	23.30%
	20-30 min	83	71.60%
	31-45 min	33	28.40%
Challenges	Noise	89	76.7%
	Claustrophobia	62	53.4%
	Long duration	38	32.8%
	Pain	14	12.1%

**Table-1:** Socio-demographic and clinical characteristics of participants

The association between demographic variables with anxiety and comfort scores is presented in Table 2 and Table 3, respectively.

Males had a mean anxiety score of  $9.8 \pm 3.2$  and a comfort score of  $4.6 \pm 1.3$ , meanwhile females had a mean anxiety score of  $10.2 \pm 3.5$  and a comfort score of  $4.2 \pm 1.2$ . There is no statistical association was observed between gender and both anxiety and comfort scores.

A statistically significant association was found between education level and both anxiety and comfort scores ( $p < 0.001$ ). Highest anxiety score ( $11.4 \pm 2.9$ ) and lowest comfort score ( $3.7 \pm 1.0$ ) was seen in Illiterate participants, whereas graduates were reported lowest anxiety score ( $5.4 \pm 1.1$ ) and highest comfort score ( $5.8 \pm 0.8$ ). Intermediate values were observed among primary and secondary education groups.

Residence showed a statistical association with both anxiety and comfort scores. Rural areas participants had higher anxiety scores ( $10.1 \pm 3.3$ ) and lower comfort scores ( $4.3 \pm 1.3$ ), while participants from urban areas were recorded lower anxiety scores ( $7.8 \pm 2.6$ ) and higher comfort scores ( $5.1 \pm 1.0$ )

Married participants had a mean anxiety score of  $10.1 \pm 3.4$  and a comfort score of  $4.4 \pm 1.3$ , whereas single participants had a anxiety score of  $8.5 \pm 2.7$  and comfort score of  $4.8 \pm 1.2$ . However, no statistical significant association was found with either anxiety or comfort scores.

A statistically significant association was seen between occupation and both anxiety and comfort score ( $p = 0.002$  and  $p < 0.001$ , respectively). Higher

anxiety scores and lower comfort score were seen in house wives and farmers/workers than the business/job and study/other occupation participants.

Overall experience	n (%)
Good	70 (60.3%)
Average	46 (39.7%)

**Table-2 :** Distribution of Patient Experience

Out of 116 patients, 60.3% of patients rated their overall experience as good and 39.7% rated as average.

Basic type	Categories	Frequency	percentage	Anxiety score Mean $\pm$ SD	p value
Gender	Male	61	52.6%	$9.8 \pm 3.2$	0.412
	Female	55	47.4%	$10.2 \pm 3.5$	
Education	Illiterate	44	37.9%	$11.4 \pm 2.9$	<0.001
	Primary	40	34.5%	$10.1 \pm 2.7$	
	Secondary	27	23.3%	$7.6 \pm 2.4$	
	Graduate	5	4.3%	$5.4 \pm 1.1$	
Residence	Rural	107	92.2%	$10.1 \pm 3.3$	0.038
	Urban	9	4.8%	$7.8 \pm 2.6$	
Marital status	Married	108	93.1%	$10.1 \pm 3.4$	0.213
	Single	8	6.9%	$8.5 \pm 2.7$	
Occupation	Farmer/worker	31	26.7%	$10.9 \pm 3.0$	0.002
	House wife	28	24.1%	$11.5 \pm 2.8$	
	Business/Job	34	29.3%	$8.4 \pm 2.9$	
	Study/Other	23	19.8%	$8.2 \pm 3.1$	

**Table-3:** Distribution of anxiety scores according to demographic characteristics

Basic type	Categories	Frequency	percentage	Comfort score Mean $\pm$	p value
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				SD	
Gender	Male	61	52. 60%	4.6 ± 1.3	0.0 87
	Female	55	47. 40%	4.2 ± 1.2	
Education	Illiterate	44	37. 90%	3.7 ± 1.0	<0. 001
	Primary	40	34. 50%	4.3 ± 1.1	
	Secondary	27	23. 30%	5.1 ± 1.2	
	Graduate	5	4.3 0%	5.8 ± 0.8	
Residence	Rural	107	92. 20%	4.3 ± 1.3	0.0 29
	Urban	9	4.8 0%	5.1 ± 1.0	
Marital status	Married	108	93. 10%	4.4 ± 1.3	0.3 15
	Single	8	6.9 0%	4.8 ± 1.2	
Occupation	Farmer/worker	31	26. 70%	3.9 ± 1.1	<0. 001
	Housewife	28	24. 10%	3.8 ± 0.9	
	Business/Job	34	29. 30%	4.9 ± 1.2	
	Study/Other	23	19. 80%	4.6 ± 1.3	

**Table-4:** Comparison of comfort scores across demographic variables

**Discussion**

In this study of 116 patients, population showed a slight male predominance with a mean age of around 42 years, and most participants were from rural areas and undergoing MRI for the first time. Similar demographic patterns have been seen in **Masalma et al.** and **Zhou et al.**<sup>(7,10)</sup> suggesting that MRI utilization is more common among middle-aged individuals, often with limited prior exposure to the procedure. This lack of familiarity may contribute to increased anxiety levels.

Most participants reported an average experience, while a smaller proportion described it as good. The primary difficulties encountered were noise, confined space, and longer scan duration. These findings are consistent with those reported by **Lixing Lei et al.**<sup>(5)</sup> who identified acoustic noise and claustrophobic environment as major contributors to patient discomfort during MRI. Such factors can heighten

anxiety, particularly in individuals who are not adequately prepared.

In the present study, females exhibited slightly higher anxiety levels than males, although the difference was not statistically significant, which agrees with findings by **Lixing Lei et al.** A significant association was observed between education and anxiety, with lower educational levels corresponding to higher anxiety. This may be due to reduced awareness and understanding of the procedure. In contrast, **Lixing Lei et al.**<sup>(5)</sup> reported no significant association with education, indicating possible differences in population characteristics.

Participants from rural areas demonstrated significantly higher anxiety compared to urban individuals, likely due to limited exposure to advanced diagnostic procedures and lower health literacy. This finding differs from the observations of **Lixing Lei et al.**, who reported no significant association with residence. Occupational variation was also evident, with housewives, farmers, and workers experiencing higher anxiety levels compared to professionals and students, possibly reflecting differences in awareness and coping ability.

Comfort levels showed an inverse relationship with anxiety. Males reported slightly higher comfort than females, although not statistically significant. Comfort improved with higher education and urban residence, which may be attributed to better understanding and psychological preparedness. However, **Muhammed Tekinhatun et al.**<sup>(12)</sup> reported no significant association between comfort and these variables, highlighting variability across different study populations.

Age was found to be positively associated with anxiety and negatively associated with comfort, suggesting that older individuals experience more discomfort during MRI. This finding contrasts with **Marina Mohallem et al.**<sup>(16)</sup> who reported no significant relationship between age and anxiety.

**Conclusion**

The present study concludes that patients undergoing 3T MRI commonly experience moderate levels of anxiety and average overall experience, primarily due to factors such as noise, enclosed space, and prolonged scan duration. Anxiety levels were found to be higher among females, rural participants, and individuals with lower educational status, although gender differences were not statistically significant. Education showed a strong inverse relationship with anxiety, indicating that awareness plays an important

role in reducing patient distress. Similarly, comfort levels were higher among educated and urban participants, suggesting that familiarity with medical procedures improves patient tolerance. Occupational differences also influenced both anxiety and comfort, with housewives, farmers, and workers reporting higher anxiety and lower comfort levels. Age demonstrated a positive association with anxiety and a negative association with comfort, indicating that older patients may require additional support. A strong negative correlation between anxiety and comfort was observed, emphasizing that increased anxiety directly reduces patient comfort. Scan duration also contributed to patient discomfort and anxiety, highlighting the need for efficient imaging protocols. Overall, improving patient education, communication, and comfort measures can significantly enhance the MRI experience and reduce anxiety levels.

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