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EFFECT OF PRE-SCAN VIDEO EDUCATION ON ANXIETY AND MOTION ARTIFACTS DURING MRI: A STUDY HELD AT SAIDU GROUP OF TEACHING HOSPITAL, SAIDU SHARIF

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Abstract

Introduction and Background: Magnetic Resonance Imaging (MRI) is an important diagnostic imaging modality widely used for the evaluation of different medical conditions. Despite its advantages, many patients experience anxiety during MRI examinations because of the enclosed environment, loud machine noise, and prolonged scan duration. Increased anxiety may lead to patient

movement, resulting in motion artifacts that reduce image quality and may require repeat scans. Patient education before MRI procedures may help reduce anxiety and improve patient cooperation. Materials and Methods: A quantitative comparative study was conducted at Saidu Group of Teaching Hospital among 100 patients undergoing MRI examinations (control n = 50; intervention n = 50). The intervention group received a pre-scan educational video; the control group received routine verbal instructions. Anxiety was measured using the STAI-S scale. Motion artifacts were graded by blinded radiologists on a four-point scale. Results: Patients who viewed the pre-scan video had significantly lower post-intervention anxiety (mean STAI-S: 33.4 ± 6.5 vs. 45.6 ± 7.8; $p < 0.001$; Cohen's d = 1.71). Clinically acceptable images were achieved in 92.0% of the intervention group vs. 66.0% of the control group ($p = 0.002$). Repeat scans were required in 6.0% vs. 20.0% of cases ($p = 0.037$). Conclusion: Pre-scan video education is an effective, practical, and cost-efficient method for reducing anxiety and minimizing motion artifacts during MRI. Routine incorporation of audiovisual educational tools in MRI departments is recommended.

Keywords: MRI; Anxiety; Motion Artifacts; Pre-Scan Video Education; Patient Cooperation; Image Quality; Patient Education.

1. INTRODUCTION

Magnetic Resonance Imaging (MRI) is one of the most advanced and non-invasive diagnostic imaging techniques used for the evaluation of various pathological conditions. It provides high-quality images of soft tissues, organs, and anatomical structures without the use of ionizing radiation. Despite its diagnostic advantages, MRI procedures are often associated with patient anxiety and discomfort due to factors such as the confined space of the scanner, loud acoustic noise, long examination times, and fear of the unknown.[1]

Patient movement during MRI scanning is a major cause of motion artifacts, which degrade image quality and may lead to inaccurate diagnosis, prolonged scan times, or the need for repeat examinations. Motion artifacts not only increase healthcare costs and reduce departmental efficiency but also create additional stress for patients. Therefore, reducing patient anxiety before MRI examinations is essential for improving both patient experience and image quality.[2-3]

Various strategies have been used to reduce MRI-related anxiety, including verbal reassurance, music therapy, sedation, and patient education.[4-5] Among these methods, pre-scan educational videos have emerged as a simple, cost-effective, and non-pharmacological intervention. These videos provide patients with information regarding the MRI procedure, expected sounds, positioning, safety precautions, and duration of the scan. By improving patient understanding and preparation, educational videos may help reduce fear and anxiety, leading to better patient cooperation and fewer motion artifacts.[6]

This study was conducted at Saidu Group of Teaching Hospital to assess the effect of pre-scan video education on anxiety levels and motion artifacts among patients undergoing MRI examinations.

2. MATERIALS AND METHODS

2.1 Study Design and Setting

This quantitative comparative study was conducted in the MRI Department of Saidu Group of Teaching Hospital, Saidu Sharif, Khyber Pakhtunkhwa, Pakistan over six months, following ethical review committee approval.

2.2 Participants and Sampling

One hundred patients referred for first-time MRI examinations were enrolled via convenient sampling. Inclusion criteria: age $\geqslant$ 18 years, first MRI examination, written informed consent. Exclusion criteria: severe psychological disorders, hearing impairment, emergency conditions, or requirement for sedation.

2.3 Grouping and Intervention

Participants were randomly assigned to two equal groups (n = 50 each). The control group received routine verbal instructions. The intervention group watched a structured pre-scan educational video (10–15 minutes) covering the MRI procedure, machine sounds, scan duration, patient positioning, breathing instructions, and safety precautions.

2.4 Outcome Measures

Anxiety was assessed before and after the intervention using the State-Trait Anxiety Inventory – State Subscale (STAI-S). Motion artifacts were graded by blinded radiologists

as: Grade 1 (none), Grade 2 (mild), Grade 3 (moderate), and Grade 4 (severe/non-diagnostic).

2.5 Statistical Analysis

SPSS version 25 was used. Independent samples t-tests were applied for continuous variables; chi-square tests for categorical data. Significance level: $p < 0.05$. Effect size was calculated as Cohen's d.

3. RESULTS

One hundred patients (control n = 50; intervention n = 50; mean age 39.6 ± 12.4 years) completed the study. No significant baseline differences were found between groups (all $p > 0.05$), confirming group equivalence.

3.1 Baseline Demographic and Clinical Characteristics

Table 1: *Baseline Demographic and Clinical Characteristics of Study Participants (n = 100)*

Demographic Variable	Control Group (n = 50)	Intervention Group (n = 50)	χ^2 / t	p-value
Age (years) – Mean ± SD	39.4 ± 12.1	39.8 ± 12.7	t = 0.18	0.856
Sex				
Male – n (%)	28 (56.0%)	27 (54.0%)	χ^2 = 0.04	0.841
Female – n (%)	22 (44.0%)	23 (46.0%)	—	—
Education Level				
Primary / Secondary – n (%)	21 (42.0%)	22 (44.0%)	χ^2 = 0.04	0.839
Tertiary / Graduate – n (%)	29 (58.0%)	28 (56.0%)	—	—
First MRI Examination	50 (100%)	50 (100%)	—	—
Body Region Scanned				
Brain / Head – n (%)	16 (32.0%)	17 (34.0%)	χ^2 = 0.52	0.971

Demographic Variable	Control Group (n = 50)	Intervention Group (n = 50)	χ^2 / t	p-value
Spine – n (%)	17 (34.0%)	16 (32.0%)	—	—
Abdomen / Pelvis – n (%)	11 (22.0%)	10 (20.0%)	—	—
Musculoskeletal – n (%)	6 (12.0%)	7 (14.0%)	—	—
Baseline STAI-S Score – Mean ± SD	49.8 ± 8.5	50.2 ± 8.2	t = 0.27	0.789

Note. SD = standard deviation; χ^2 = chi-square; t = independent t-test. No significant between-group differences at baseline (all $p > 0.05$).

3.2 Anxiety Scores

The intervention group showed a significantly greater STAI-S reduction (Δ = 16.8 ± 4.1 vs. 4.2 ± 3.4; mean difference = 12.2, 95% CI: 9.6–14.8; t = 9.21, $p < 0.001$; Cohen's d = 1.71). Figure 1 illustrates the distribution shift in anxiety scores between groups.

Table 2: *Comparison of Anxiety Scores (STAI-S) Before and After Intervention*

Measurement	Control Mean ± SD	Intervention Mean ± SD	Mean Diff. (95% CI)	t-value	p-value
Pre-Intervention STAI-S Score	49.8 ± 8.5	50.2 ± 8.2	−0.4 (−3.4, 2.6)	0.27	0.789
Post-Intervention STAI-S Score	45.6 ± 7.8	33.4 ± 6.5	12.2 (9.6, 14.8)	9.21	<0.001*
Mean Reduction (Pre − Post)	4.2 ± 3.4	16.8 ± 4.1	12.6 (11.1, 14.1)	16.47	<0.001*
Percentage Reduction (%)	8.4%	33.5%	25.1%	—	—
Post-Scan Score < 40 – n (%)	11 (22.0%)	36 (72.0%)	—	—	<0.001*
Effect Size	—	—	d = 1.71	—	—

Measurement	Control Mean ± SD	Intervention Mean ± SD	Mean Diff. (95% CI)	t-value	p-value	(Cohen's d)

Note. * p < 0.05. STAI-S = State-Trait Anxiety Inventory – State Subscale. 95% CI = confidence interval. Cohen's d > 0.8 = large effect.

Figure 1. Anxiety Score Distribution Histograms

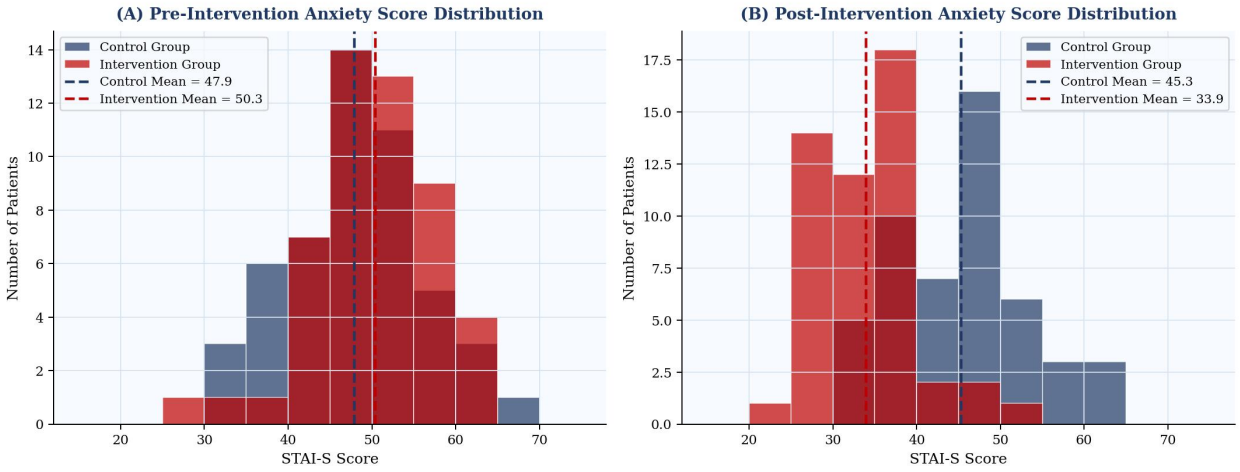

Figure 1. Distribution of pre-intervention (A) and post-intervention (B) STAI-S anxiety scores for the Control Group (dark blue) and Intervention Group (red). Dashed vertical lines indicate group means. The pronounced leftward shift in the Intervention Group post-intervention reflects a clinically meaningful anxiety reduction ($p < 0.001$).

3.3 Motion Artifact Grades

Clinically acceptable scans (Grades 1 + 2) were achieved in 92.0% of the intervention group vs. 66.0% of the control group ($\chi^2 = 10.04$, $p = 0.002$). No Grade 4 artifacts occurred in the intervention group (vs. 8.0% in controls; $p = 0.041$). Full grade distributions are detailed in Table 3 and illustrated in Figure 2.

Table 3: *Distribution of MRI Motion Artifact Grades by Group (n = 50 per group)*

Motion Artifact Grade	Ctrl n	Control (%)	Int n	Intervention (%)	χ^2	p-value
Grade 1 – None (Fully diagnostic)	14	28.0%	30	60.0%	10.29	0.001*
Grade 2 – Mild (Minimally degraded, diagnostic)	19	38.0%	16	32.0%	0.42	0.517
Grade 3 – Moderate (Diagnostic confidence ↓)	13	26.0%	4	8.0%	5.74	0.017*
Grade 4 – Severe (Non-diagnostic)	4	8.0%	0	0.0%	4.17	0.041*
Clinically Acceptable (Grade 1 + 2)	33	66.0%	46	92.0%	10.04	0.002*
Clinically Unacceptable (Grade 3 + 4)	17	34.0%	4	8.0%	10.04	0.002*

Note. * $p < 0.05$ (chi-square). Blue shading = clinically acceptable; red = clinically unacceptable. Grade 1 = none; Grade 2 = mild; Grade 3 = moderate; Grade 4 = severe.

Figure 2. Motion Artifact Grade Distribution

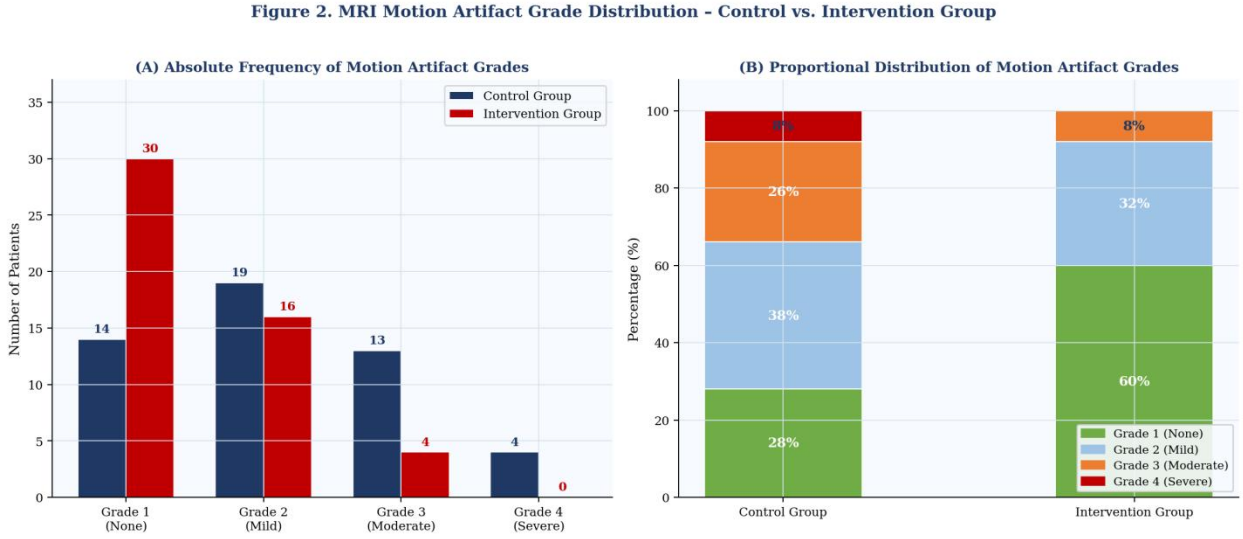

Figure 2. MRI motion artifact grade distribution: (A) grouped bar chart showing absolute frequencies; (B) stacked percentage bar chart. The Intervention Group shows a markedly higher proportion of Grade 1 (no artifact) scans and no Grade 4 (severe) artifacts ($p < 0.001$).

3.4 Anxiety Score Trajectories

Figure 3 illustrates the mean STAI-S scores at pre- and post-intervention time points with error bars representing ±1 SD. The Intervention Group exhibits a substantially steeper reduction.

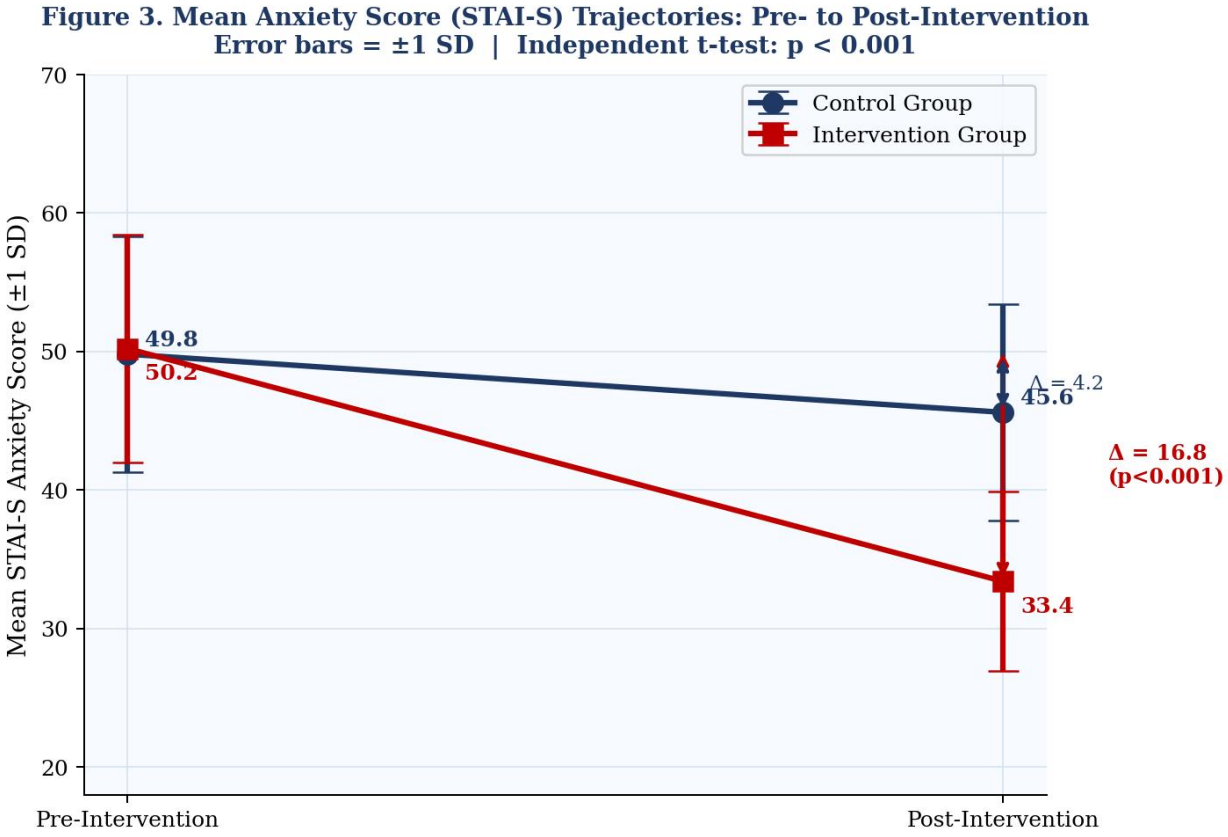

Figure 3. Mean STAI-S anxiety score trajectories (pre- to post-intervention) for both groups. Error bars = ±1 SD. The Intervention Group exhibits a significantly greater reduction (Δ = 12.2 points, $p < 0.001$) than the Control Group (Δ = 4.2 points). Independent t-test confirmed statistical significance.

3.5 Patient Cooperation and Repeat Scans

The intervention group demonstrated significantly higher rates of excellent cooperation (56.0% vs. 24.0%; $p = 0.001$) and fewer repeat scans (6.0% vs. 20.0%; $p = 0.037$), as shown in Table 4 and Figure 4.

Table 4: *Patient Cooperation Level During MRI Examination by Group*

Cooperation Level	Control n	Control (%)	Intervention n	Intervention (%)	χ^2 (p-value)
Excellent (full compliance)	12	24.0%	28	56.0%	χ^2=11.27 (0.001*)

Cooperation Level	Control n	Control (%)	Intervention n	Intervention (%)	χ^2 (p-value)
Good (minor movement)	20	40.0%	18	36.0%	χ^2=0.17 (0.682)
Fair (occasional movement)	13	26.0%	4	8.0%	χ^2=5.74 (0.017*)
Poor (frequent movement)	5	10.0%	0	0.0%	χ^2=5.26 (0.022*)
Repeat Scan Required – n (%)	10	20.0%	3	6.0%	χ^2=4.33 (0.037*)

Note. * p < 0.05. Cooperation graded by radiographer blinded to group status. Repeat scan = re-acquisition due to motion artifact or non-compliance.

Figure 4. Patient Cooperation Level

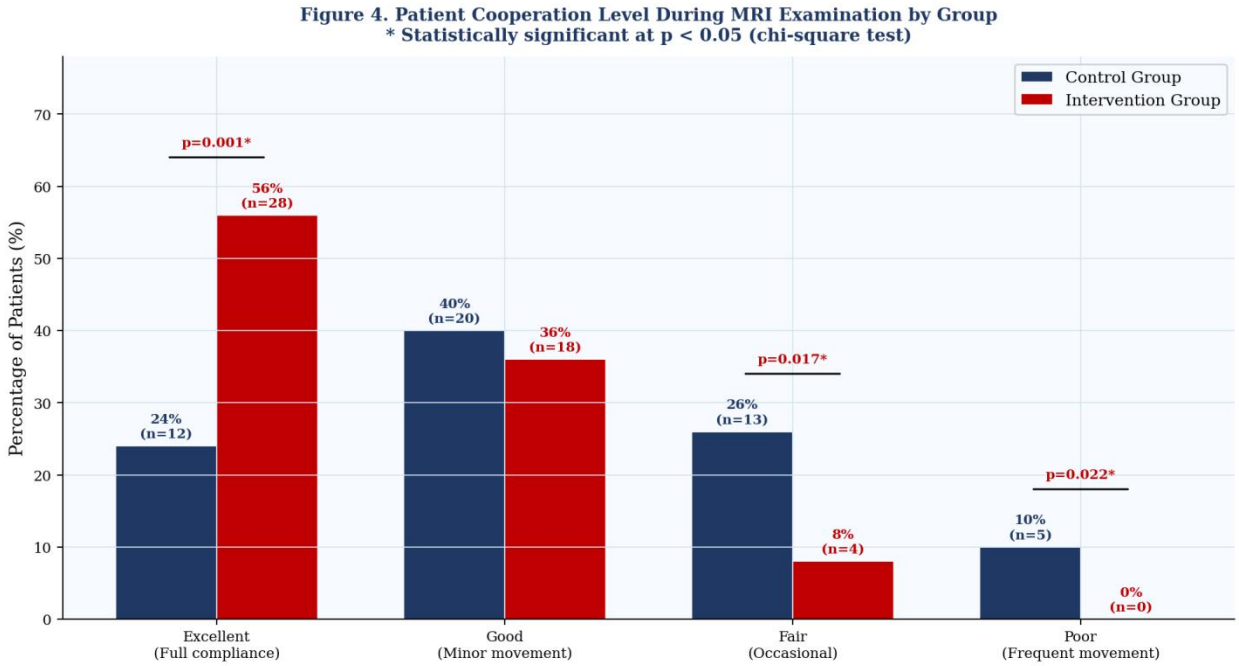

Figure 4. Patient cooperation level during MRI examination by group. The Intervention Group shows significantly higher rates of Excellent cooperation (56% vs. 24%, p = 0.001)

and no instances of Poor cooperation (vs. 10% in the Control Group). Significance brackets mark $p < 0.05$ pairs.

3.6 Summary of Outcome Measures

Table 5: *Summary of Primary and Secondary Outcome Measures by Group*

Outcome Measure	Control Group (n = 50)	Intervention Group (n = 50)	Statistical Significance
Post-Intervention Anxiety (Mean ± SD)	45.6 ± 7.8	33.4 ± 6.5	p < 0.001*
Anxiety Reduction (%)	8.4%	33.5%	p < 0.001*
Diagnostic Image Quality (%)	66.0%	92.0%	p = 0.002*
Moderate / Severe Artifacts (%)	34.0%	8.0%	p = 0.002*
Excellent Patient Cooperation (%)	24.0%	56.0%	p = 0.001*
Repeat Scans Required – n (%)	10 (20.0%)	3 (6.0%)	p = 0.037*

Note. * p < 0.05. Diagnostic image quality = proportion of scans graded Grade 1 or Grade 2.

4. DISCUSSION

The present study evaluated pre-scan video education as an intervention to reduce MRI-related anxiety and motion artifacts. The intervention group demonstrated a significantly greater reduction in STAI-S scores (Cohen's d = 1.71, indicating a large effect), a higher proportion of diagnostically acceptable images (92.0% vs. 66.0%), and a lower rate of repeat scans (6.0% vs. 20.0%), all consistent with prior literature on patient preparation in diagnostic imaging.[3-5]

MRI anxiety arises from the confined scanner environment, loud acoustic noise, prolonged examination time, and unfamiliarity with the procedure.[1] The pre-scan video addressed these factors directly by providing clear information on expected sounds, positioning, and duration. This is consistent with cognitive-behavioral models of anxiety in which uncertainty amplifies fear; reducing uncertainty through structured education decreases perceived threat.[4]

Reduced anxiety translates directly into improved patient immobility. Motion artifacts are among the most prevalent causes of non-diagnostic MRI scans globally, increasing both cost and radiation-equivalent scan repetition.[2] By significantly reducing Grade 3 and 4 artifacts, the educational intervention improved departmental workflow efficiency and diagnostic yield without additional pharmacological interventions.

Patient cooperation and repeat scan reduction are particularly important in resource-limited settings such as district and teaching hospitals in Pakistan, where scanner availability is constrained. The 14% absolute reduction in repeat scan rates observed in this study could meaningfully increase throughput and reduce patient waiting times.[7]

4.1 Strengths of the Study

- Addressed a clinically important problem with a low-cost, scalable, non-pharmacological intervention.
- Assessed both psychological (anxiety) and technical (motion artifacts, image quality) outcomes comprehensively.
- Radiologist grading of artifacts was blinded to group allocation, minimizing observer bias.

Conducted in a real clinical setting, enhancing external validity and practical applicability.

4.2 Limitations of the Study

- Single-centre design limits generalizability to broader populations and healthcare settings.
- Relatively small sample size (n = 100) may reduce statistical power for subgroup analyses.
- Anxiety measurement relied on self-reported questionnaires, subject to response and social-desirability bias.
- Only first-time MRI patients were included; effects on patients with prior MRI experience remain unknown.
- Variation in MRI examination type and duration was not fully controlled.

5. CONCLUSION

Pre-scan video education is an effective, simple, and cost-efficient strategy for reducing anxiety and minimizing motion artifacts in patients undergoing MRI examinations.

Patients who received the educational intervention demonstrated significantly lower post-intervention anxiety (Cohen's d = 1.71), higher diagnostic image quality (92.0% vs. 66.0%), and fewer repeat scans (6.0% vs. 20.0%) compared to the control group. Routine implementation of audiovisual educational tools in MRI departments is recommended to enhance patient comfort, improve diagnostic quality, and increase departmental efficiency.

RECOMMENDATIONS

Pre-scan educational videos should be incorporated into routine MRI practice across hospitals in Pakistan.

- Standardized audiovisual materials should be developed in local languages (Urdu, Pashto) for broader patient understanding.
- Multicenter studies with larger sample sizes should be conducted to validate and generalize these findings.
- Future research should compare pre-scan video education with other anxiety-reduction modalities (music therapy, virtual reality, counseling).
- Long-term impact on patient satisfaction, repeat scan rates, and departmental costs should be evaluated.
- Radiologic technologists should receive training in patient communication and psychological preparation for MRI.

ETHICAL STATEMENT

This study was approved by the Ethical Review Committee of Saidu Group of Teaching Hospital, Saidu Sharif, KP, Pakistan. Written informed consent was obtained from all participants prior to enrolment. The study was conducted in accordance with the Declaration of Helsinki (revised 2013). Patient confidentiality was maintained throughout.

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CONFLICT OF INTEREST AND FUNDING

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AUTHOR CONTRIBUTIONS

[Author 1]: Conceptualization, study design, data collection, manuscript drafting. [Author 2]: Statistical analysis, results interpretation. [Author 3]: Supervision, critical revision. All authors have read and approved the final version.

REFERENCES

1. Meléndez JC, McCrank E. Anxiety-related reactions associated with magnetic resonance imaging examinations. JAMA. 1993;270(14):1697–1699.
2. Katz RC, Wilson L, Frazer N. Anxiety and its determinants in patients undergoing magnetic resonance imaging. J Magn Reson Imaging. 1994;4(5):589–592.
3. Tazegul G, Etcioglu E, Yildiz F. The effect of patient education on anxiety and motion artifacts during MRI examinations. Radiol Technol. 2015;86(4):363–369.
4. Kilborn LC, Labbe EE. Magnetic resonance imaging scanning procedures: Development of phobic response during scan and at one-month follow-up. Eur J Radiol. 1990;11(1):45–48.
5. Grey SJ, Price G, Mathews A. Reduction of anxiety during MR imaging: A controlled trial. J Med Imaging Radiat Sci. 2000;31(4):220–224.
6. Eshed I, Althoff CE, Hamm B, Hermann KG. Claustrophobia and premature termination of magnetic resonance imaging examinations. Magn Reson Imaging. 2007;25(3):401–404.
7. Ahmad M, Khan AN, Ali S. Assessment of patient anxiety and motion artifacts during MRI procedures in tertiary care hospitals. Pak J Radiol. 2018;28(2):45–50.
8. Bontrager KL, Lampignano JP. Textbook of Radiographic Positioning and Related Anatomy. 9th ed. St. Louis: Elsevier; 2017.
9. Westbrook C, Roth CK, Talbot J. MRI in Practice. 5th ed. Oxford: Wiley-Blackwell; 2018.
10. World Health Organization. Patient-centred Care and Communication in Diagnostic Imaging. Geneva: WHO; 2021.