STUDY PROTOCOL

Effectiveness of Jacobson's Progressive Muscle Relaxation Technique (JPMR) on Fracture-Related Anxiety in Adult Patients With Long Bone Fractures in the Emergency Department

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Study Protocol

TITLE :

"Effectiveness of Jacobson's Progressive Muscle Relaxation Technique on Fracture-Related Anxiety in Adult Patients with Long Bone Fractures in the Emergency Department."

PRESENTED BY:

Christina Jeyasingh
MSN

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BACKGROUND:

Fractures are a common musculoskeletal injury affecting millions globally each year. Long bone fractures, in particular, are often associated with significant pain, temporary loss of function, and extended recovery periods **(**Jones & Miller, 2020). While physical consequences are well-documented, there is increasing recognition of the psychological impact, particularly anxiety in fracture patients.

Anxiety in the context of fractures can stem from sudden trauma, uncertainty about outcomes, surgical interventions, and limitations in mobility (McDonald et al., 2017)**.** These symptoms can interfere with pain perception, reduce adherence to treatment plans, and delay physical recovery. Although both anxiety and depression are known psychological responses to injury, this study focuses specifically on fracture-related anxiety due to its immediate and measurable effects in acute care settings such as the emergency department (Choi et al., 2020) .

Despite advancements in surgical and rehabilitative care, the psychological aspects of fracture recovery are often overlooked. Studies have shown that approximately 30% to 40% of patients with orthopaedic injuries experience anxiety during the recovery process (Choi et al., 2020)**.**These symptoms may persist even after the physical injury has healed, affecting long-term outcomes. Factors such as the severity and location of the fracture, pre-existing mental health conditions, and social support systems can all influence anxiety levels.

One promising intervention is Jacobson's Progressive Muscle Relaxation Technique (JPMRT) a simple, cost-effective method involving the tensing and relaxing of muscle groups to promote relaxation. JPMRT has shown effectiveness in reducing

anxiety across various clinical populations. Its feasibility in acute care settings makes it a practical tool for enhancing patient comfort and psychological well-being (Lee & Kim, 2018). However, much of the existing research is limited by small sample size and a lack of focused intervention targeting anxiety. Furthermore , there is limited data on how non pharmacological techniques might help reduce anxiety and improve recovery in emergency settings. This study will evaluate the effectiveness of JPMRT in reducing fracture-related anxiety among adult patients with long bone fractures in the emergency department.

PROBLEM STATEMENT AND RATIONALE:

Long bone fractures are common traumatic injuries managed in emergency departments and are frequently associated with significant anxiety due to severe pain, fear of disability, and uncertainty about outcomes (Pelletier et al., 2015; Taghavi et al., 2021). Elevated anxiety in these patients can intensify pain perception, hinder recovery, and reduce cooperation with medical procedures (Seers et al., 2018; McDonald et al., 2019).

While pharmacological treatments are often used to manage anxiety, they may cause side effects such as sedation and respiratory depression, and may not always be immediately accessible in emergency settings (de Witte et al., 2020). As a result, non-pharmacological approaches, such as Jacobson’s Progressive Muscle Relaxation Technique (JPMRT), present a promising alternative. JPMRT involves the systematic tensing and relaxing of muscle groups to promote relaxation and has demonstrated effectiveness in reducing anxiety across various clinical populations (Conrad & Roth, 2007; Varvogli & Darviri, 2011).

Despite its benefits, limited research has explored the application of JPMRT among patients with long bone fractures in emergency departments. Investigating this technique may offer a safe, low-cost, and effective method for reducing anxiety, improving patient experience, and enhancing the overall quality of emergency care.

RESEARCH QUESTIONS:

1. What is the level of fracture-related anxiety among adult patients with long bone fractures in the emergency department before the intervention?
2. What is the level of fracture-related anxiety among adult patients with long bone fractures after receiving Jacobson's Progressive Muscle Relaxation Technique?
3. Is there an association between the anxiety levels and the selected demographic variables among patients with long bone fractures?

AIM OF THE STUDY:

To evaluate the effectiveness of Jacobson's Progressive Muscle Relaxation (JPMRT) in reducing fracture-related anxiety among patients with long bone fractures in the emergency department.

OBJECTIVES:

1. To assess the levels of anxiety before and after JPMRT among patients with long bone fractures in the emergency department.
2. To determine the association between levels of anxiety and selected demographic variables in patients with long bone fractures.

HYPOTHESIS:

H1:There will be a significant difference in anxiety levels between the experimental group (who receive Jacobson Progressive Muscle Relaxation Technique)

and the control group (who receive routine care) among patients with long bone fractures in the emergency department.

H_2 :There will be a significant difference in pre- and post-intervention anxiety levels within the experimental group after receiving Jacobson Progressive Muscle Relaxation Technique.

H_3:There will be a significant association between post-intervention anxiety levels and selected demographic variables (age, gender, educational level, marital status, occupation, type and site of fracture, cause of injury, history of previous fractures, and duration of stay in the emergency department) among patients with long bone fractures

METHODOLOGY:

I. STUDY DESIGN:

An Experimental design will be used to evaluate the effectiveness of Jacobson Progressive Muscle Relaxation Technique (JPMRT) on fracture-related anxiety.

- Experimental Group: Received JPMRT sessions in addition to routine care.
- Control Group: Received routine care only.

II. STUDY AREA / SETTING:

The study will be conducted at Rashid Hospital Trauma Centre in Dubai, a specialized emergency and trauma care facility with a 70-bed capacity in the Emergency Department. On an average, the Emergency Department (ED) receives approximately 100 patients with long bone fractures per month. Patients with long bone

fractures are initially stabilized in the minor area of the ED. Following stabilization, they are transferred to the major area for a 3-6 hours for observation period before being either admitted to the hospital or taken to the operating theatre for surgical intervention. Data collection will be carried out during this observation period in the major area.

III. STUDY DURATION

The study will be conducted over a period of 3 months**,** following approval from the RAKMHSU Research Ethical Committee and the Rashid Trauma Center administration. This time frame will include patient recruitment, the administration of Jacobson's Progressive Muscle Relaxation Technique, and the assessment of anxiety levels before and after the intervention.

IV. STUDY POPULATION

The study population will consist of adults aged 25 to 59 years, who have been diagnosed with long bone fractures and admitted to the Emergency Department at Rashid Hospital, Dubai. These patients will be selected based on the inclusion and exclusion criteria and will be approached to participate in the study prior to receiving Jacobson's Progressive Muscle Relaxation Technique.

V. INCLUSION CRITERIA

1. Adults aged 25 to 59 years.
2. Patients diagnosed with one or more long bone fractures (femur, tibia, fibula, humerus, radius, or ulna) in the Emergency Department (clinically confirmed).
3. Patients with a stable medical condition.
4. Able to participate in non-pharmacological interventions such as Jacobson's Progressive Muscle Relaxation Technique.

5. Able to understand and communicate in English or Arabic, and to provide informed consent and respond to anxiety assessment tools.

EXCLUSION CRITERIA

1. Patients with cognitive impairments or conditions that affect the ability to understand the procedure or complete the anxiety assessment.
2. Patients with diagnosed psychiatric conditions or currently under psychiatric medication.
3. Patients who are undergoing or are planned to undergo immediate surgery for the fracture.

VI. DETERMINATION OF SAMPLE SIZE:

The sample size for the current quasi-experimental study was determined using a statistical power analysis tailored to the pretest-posttest design. Assuming a medium effect size (Cohen's d = 0.5), a significance level of α = 0.05, and a statistical power of 0.80, a minimum of 34 participants is required to detect a statistically significant difference in anxiety levels before and after the intervention. To accommodate potential attrition or incomplete responses, the sample size will be increased to 35 participants. This number is deemed sufficient to ensure the validity and reliability of the findings (Polit & Beck, 2021).

VII. SAMPLING METHOD :

A convenience sampling method will be used to recruit participants for this study. Participants will be selected from the Emergency Department at Rashid Trauma Center, Dubai, based on the inclusion and exclusion criteria. This sampling approach was

chosen due to its feasibility in an emergency department setting, where patients may present with acute injuries and require prompt participation.

The participants will be approached after being transferred to the Major Area for observation in the Emergency Department, following their stabilization in the Minor Area. After verifying that they meet the inclusion criteria, eligible patients will be invited to participate in the study prior to administration of JPMR technique. Consent will be obtained from those who agree to participate.

VIII. DATA COLLECTION :

This study will involve the use of the Fracture-Specific Anxiety Scale (FSAS) to assess the level of anxiety in adult patients with long bone fractures. Prior to full-scale data collection begins, a pilot study will be conducted to assess the clarity, relevance, and effectiveness of the FSAS. Based on pilot findings and expert feedback, necessary adjustments will be made to ensure the tool's suitability and accuracy for the target population.

Data Collection Tool:

Section A: Demographic Data Sheet (Annexure 1)

This section will collect baseline information about each participant, including age, gender, educational level, marital status, occupation, type and site of fracture, cause of injury, history of previous fractures, and duration of stay in the emergency department. This data will help to identifying potential associations between demographic characteristics and anxiety levels.

Section B: Fracture-Specific Anxiety Scale (FSAS) (Annexure 2)

The FSAS will be used to assess the anxiety levels specifically related to

fractures. It is adapted from validated tools such as the Generalized Anxiety Disorder Scale (GAD-7), with a focus on the emotional responses of patients dealing with fractures. The FSAS will be administered twice:

Before the intervention (upon stabilization and during observation period)

After the intervention (following the application of Jacobson's Progressive Muscle Relaxation Technique)

This pre- and post-test approach will allow evaluation of the JPMR's effectiveness in reducing levels of anxiety in patients with long bone fracture.

Scoring and Interpretation

Each FSAS item is rated on a 5-point Likert scale from 0 (Never) to 4 (Always). Scores for each item are summed to calculate a total score, ranging from 0 to 40. Levels of anxiety will be interpreted as follows:

- 0–9: Minimal anxiety
- 10–19: Mild anxiety
- 20–29: Moderate anxiety
- 30–40: Severe anxiety

Section C: Visual Analog Scale (VAS) for Pain (Annexure 3)

Pain levels will be measured using the Visual Analog Scale (VAS), which is a 10-point scale ranging from 0 (no pain) to 10 (worst pain imaginable). Pain will also be assessed before and after the intervention to examine any correlation between pain reduction and anxiety levels.

To ensure accuracy and appropriateness, the tools will be undergo content validation by a panel of experts. Reliability will be evaluated through a pilot study conducted with 3 participants to examine clarity, consistency, and suitability for the target population.

Pilot Study:

A pilot study will be conducted on three patients with long bone fractures at Rashid Trauma Center, Dubai. These participants will complete the Fracture-Specific Anxiety Scale (FSAS) both before and after receiving the Jacobson's Progressive Muscle Relaxation (PMR) technique. The aim of the pilot study is to evaluate the clarity, relevance, and appropriateness of the FSAS items and scoring system in capturing anxiety specific to fracture experiences. The findings from the pilot will help identify any necessary revisions to improve the tool's clarity and content validity. Additionally, reliability testing using Cronbach's alpha will be conducted to assess the internal consistency of the FSAS, ensuring its suitability for the main study.

Data collection Procedure:

The data collection will occur in three phases:

1.Pre-Intervention Phase:

Patients in the Major Area will be waiting for admission or transfer to the operating theatre (OT) with a waiting period of at least 3 to 6 hours before either admission to the ward or transfer to the OT. After obtaining informed consent**,** participants will complete the demographic variables sheet and FSAS to assess their baseline anxiety levels along with the Visual Analogue Scale (VAS) to measure the intensity of pain.

2.Intervention Phase (Jacobson's Progressive Muscle Relaxation Technique):

Participants will receive a session of JPMR technique, a non-pharmacological intervention involving a sequence of muscle tension and relaxation exercises. The session will be guided by the researcher, lasting approximately 20–30 minutes**,** conducted in a calm and private setting within the Major Area of the Emergency Department.

INTERVENTION PROTOCOL:

Jacobson's Progressive Muscle Relaxation (PMR) Technique

Timing of Procedure:

The JPMR technique will be conducted once, after the patient has been stabilized and transferred to the Major Area of the Emergency Department. The session will last for approximately 20–30 minutes. It will not be repeated during the hospital stay.

Setting :

The intervention will be conducted in a quiet and private area within the Major Area of the Emergency Department at Rashid Hospital Trauma Centre, Dubai. The environment will be calm and free from interruptions to ensure patient comfort and focus during the session.

Procedure:

The patient will be guided to tense and relax specific muscle groups, excluding those around the fracture site. The sequence will include:

Step 1: The patient is positioned with support for the face, head and neck, ensuring complete relaxation and comfort.

Step 2: Each muscle group will be tensed for 5–7 seconds and then relaxed for 15–20 seconds under the researchers verbal guidance .

Step 3: Participants will be encouraged to maintain focus on relaxation and deep breathing to enhance comfort and reduce anxiety.

Step 4:**Mental Relaxation**: For areas near the injury where tensing may cause discomfort, mental relaxation techniques (e.g., deep breathing) will be used instead of muscle tension.

Step 5**: Breathing Exercises**: The patient will be instructed to perform slow, deep breathing exercises for 5 minutes, focusing on inhaling deeply for 4 seconds, holding for 2 seconds, and exhaling slowly for 6 seconds. This breathing technique aims to enhance relaxation and reduce anxiety.

3.**Post-Intervention Phase :**

Immediately after the JPMR session, participants will complete the FSAS again to assess any changes in their anxiety levels following the intervention along with the Visual Analogue Scale (VAS) to measure any changes in the intensity of pain.

IX. Data Analysis Plan:

The data collected will be analyzed using the Statistical Package for the Social Sciences (SPSS) software version 26 . Descriptive statistics such as mean, standard deviation, frequency, and percentage will be used to summarize the participants demographic characteristics of the participants and anxiety scores.

Open-ended responses from the pilot study will also be analysed thematically to identify patterns in patients perceptions of fracture-related anxiety and suggestions for

anxiety reduction. This qualitative feedback will enhance the relevance and clarity of the FSAS tool prior to its full implementation.

To evaluate the effectiveness of JPMR technique, paired t-tests will be conducted to compare pre- and post-intervention anxiety scores using the Fracture-Specific Anxiety Scale (FSAS). In addition, the Chi-square (χ^2) test will be used to examine the association between selected demographic variables and FSAS scores. A p-value of less than 0.05 will be considered statistically significant.

X.LIMITATIONS/EXPECTED CHALLENGES :

Limited Sample Size: Although the sample size may be small due to the 3-month data collection period, it allows for a focused and manageable study that can generate valuable insights and serves as a basis for future research.

Individual Variation: Patient experiences and coping mechanisms may vary; however, using a validated tool like the FSAS helps ensure consistency in measuring level of anxiety across individuals.

Dynamic Emergency Setting: The Emergency Department can be a unpredictable environment, it also presents a realistic context for testing practical and time-efficient interventions like JPMR technique.

Participant Availability: Some patients may not be able to participate due to clinical or personal reasons, but flexible scheduling and clear communication will help maximize participation and data collection opportunities.

XI.ETHICAL CONSIDERATIONS :

1.How will participants be recruited or cases be identified?

Participants will be recruited from the Emergency Department at Rashid Hospital, Dubai. Eligible patients who are diagnosed with long bone fractures, have been stabilized in the Minor Area, and are transferred to the Major Area for observation will be identified based on inclusion and exclusion criteria for potential participation. After receiving informed consent, patients will be invited to participate in the study during the 3-6 hour observation period before they are either admitted to the ward or transferred to the operating theatre (OT).

2.How will informed consent be obtained from participants?

Informed consent will be obtained from all participants prior to their inclusion in the study. A detailed consent form will be provided to each participant, explaining the purpose, procedure, potential risks, and benefits of the study. Participants will be assured that their participation is voluntary, and they can withdraw at any time without affecting their medical care. The researcher will ensure that participants fully understand the content of the consent form, and consent will be documented with a signature.

3.What procedures will be followed to maintain confidentiality and privacy of participant's data?

All participant data will be kept confidential and stored securely. A unique identification code will be assigned to each participant to anonymize personal information. Data will be stored on a password-protected device, and paper records (if any) will be locked in a secure location. Only the research team will have access to the data. Any reports, publications, or presentations will not include identifiable participant information, and care will be taken to protect the privacy of participants throughout the study.

4.Provide details of who will have access to the data.

Access to participant data will be strictly limited to the researcher and authorized personnel directly involved in the study. All individuals handling the data will adhere to strict confidentiality protocols to ensure the privacy and security of participant information.

5.Does the project involve any of the following risks? Indicate yes or no.

S. No.	Risk Description	Yes	No
a.	Physical risk to participants		√
b.	Psychological risks to participants		√
c.	Does the study require participants to release information of a sensitive or personal nature?		√
d.	Are there medical conditions which increase the participants' risk while in the study?		√

e.	Does this study require participants to release information which may reveal illegal activity?		√
f.	Are there any risks to the researchers?		√
g.	Any other risks?		√

Detail in this area explanations of an answer of “yes” to any of the above

6. In undertaking this research, do any “conflict of interest” issues arise? Yes/No

a. Are the participants in a dependent relationship with the investigators?

Yes/ √ NO

b. Are the participants staff at the institution where the study is taking place?

Yes/ √ No

Work Plan:

After obtaining RAKMHSU Research Ethical Committee approval following workplan will be followed :

Activity	Time Frame	EXPECTED DATE AND MONTH
Tool validation (expert review)	Week 1	29/04/2025
Pilot study (3 participants)	Week 2	06/05/2025
Finalizing the tool based on pilot feedback	Week 3	13/05/2025
Main data collection (pre- and post-intervention)	Weeks 4–8	20/05/2025-24/06/2025
Data analysis	Weeks 9–10	25/06/2025-08/07/2025
Report writing and final submission	Weeks 11–12	09/07/2025-23/07/2025

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4. Ahmed, H. A., & El Sayed, R. G. (2022). Progressive muscle relaxation as a non-pharmacological strategy to reduce anxiety in patients with musculoskeletal trauma. Middle East Journal of Nursing, 16(3), 87–94.
5. Fatima, S., & Khan, A. (2021). Efficacy of Jacobson relaxation technique in reducing preoperative anxiety among orthopedic patients: A quasi-experimental study. Asian Journal of Nursing Education and Research, 11(2), 145–150.

ANNEXURE 1

Demographic Data Sheet		
(Instructions: Please fill in the following information. Your responses will be kept confidential and used only for research purposes.)		
S. No.	**Demographic Variable**	**Response**
1	Age (in years)	____
2	Gender	☐ Male ☐ Female ☐ Other
3	Marital Status	☐ Single ☐ Married ☐ Divorced ☐ Widowed
4	Educational Qualification	☐ No formal education ☐ Primary ☐ Secondary ☐ University
5	Occupation	_____
6	Type of Long Bone Fracture	☐ Femur ☐ Tibia ☐ Fibula ☐ Humerus ☐ Radius/Ulna ☐ Multiple
7	Cause of Fracture	☐ Fall ☐ Road traffic accident ☐ Sports injury ☐ Others: _____
8	Side of Fracture	☐ Left ☐ Right ☐ Bilateral
9	First-Time or Recurrent Fracture	☐ First-time ☐ Recurrent
10	Presence of Other Medical Conditions	☐ Yes ☐ No If yes, specify: _____
11	Duration since Injury (in hours)	____
12	Previous Experience	☐ Yes ☐ No

	with Relaxation Techniques	
13	Language Preferred for Communication	

Annexure 2

FSAS Data Collection Tool

(Section A)

Instructions for FSAS: Please rate each statement based on your experience:

0 = Never 1 = Rarely 2 = Sometimes 3 = Often 4 = Always

Physical Concerns

S.no.	Item category	0(Never)	1 (Rarely)	2(sometimes)	3(Often)	4(Always)
1.	I feel nervous about the level of pain caused by my fracture.					
2.	I worry about my inability to move or complete daily activities due to my fracture.					
3.	I feel uneasy about the risk of complications, such as improper healing or infection.					

Treatment-Related Stress

	Item category	0 (Never)	1 (Rarely)	2(sometimes)	3(Often)	4(Always)

4.	I feel anxious about my treatment plan (e.g., surgeries, medications, or physical therapy).					
5.	I worry about the financial cost of managing my fracture.					
6.	I feel stressed about attending follow-up appointments or seeking medical care.					

Recovery Uncertainty

	Item category	0 (Never)	1 (Rarely)	2(sometimes)	3(Often)	4(Always)
7.	I worry about the timeline for my recovery and when I will regain normal function.					
8.	I feel apprehensive about my long-term health due to this fracture.					

Social and Emotional Impact

	Item category	0(Never)	1(Rarely)	2(sometimes)	3(Often)	4(Always)
9.	I feel uneasy about asking for help or relying on others during recovery.					
10.	I feel isolated or misunderstood					

	because of my fracture.					

(Section B)

Open-Ended Questions on Fracture-Related Anxiety

Instructions:

Please answer the following questions in your own words. There are no right or wrong answers. Your honest thoughts and experiences will help us better understand the emotional impact of fractures and identify ways to support patients like you.

1.What aspect of your fracture experience has been most stressful for you?

Your response:

_____

2.Is there anything specific that would reduce your anxiety related to your fracture?

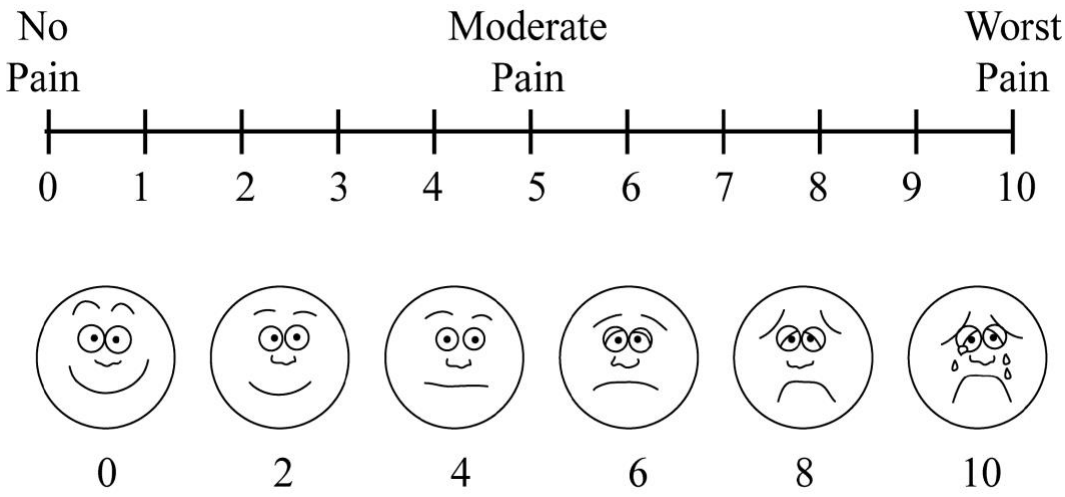
Your response:

_____

ANNEXURE 3

Visual Analog Scale (VAS) for Pain

Please mark the point on the line that best represents your pain level:



- 0 = No pain
- 1-3 = Mild pain
- 4-6 = Moderate pain
- 7-9 = Severe pain
- 10 = Worst pain imaginable