

Effectiveness of progressive muscle relaxation therapy in reducing anxiety among asthma patients in emergency department: a quasi-experimental one-group pretest–posttest study

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ABSTRACT

Introduction: Introduction and Objective: Anxiety frequently accompanies acute asthma exacerbations in emergency settings and can worsen respiratory distress and patient outcomes. Non-pharmacological strategies such as progressive muscle relaxation (PMR) may reduce anxiety through autonomic regulation. This study aimed to evaluate the effect of PMR therapy on reducing anxiety levels among asthma patients in the Emergency Department of Prembun Regional Hospital.

Research Methodology: A quasi-experimental study with a one-group pretest–posttest design was conducted over one month. A total of 28 asthma patients with anxiety were recruited using purposive sampling. Anxiety was measured using the STAIS-5 instrument. Data were analyzed using a paired sample t-test with a significance level of 0.05.

Results: The mean anxiety score decreased from 3.10 ± 0.875 to 1.92 ± 1.015 , with a mean difference (β) of 1.178 (95% CI: 0.898–1.458; $p < 0.001$). A strong positive correlation was observed between pre- and post-test scores ($r = 0.717$; $p = 0.002$). Clinically, there was a marked shift from predominantly severe anxiety before intervention to a higher proportion of patients reporting no anxiety after PMR therapy.

Conclusion: PMR therapy significantly reduces anxiety levels in asthma patients in emergency settings and can be recommended as a safe, simple, and effective complementary intervention. Integrating PMR into routine emergency nursing care may improve psychological stability and overall patient outcomes.

Keywords: anxiety; asthma; emergency service, muscle relaxation, progressive; nursing care.



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INTRODUCTION

Asthma remains a significant global public health concern due to its chronic nature, recurrent exacerbations, and substantial burden on healthcare systems, particularly in emergency settings. Acute asthma attacks frequently present in emergency departments (EDs) with symptoms such as dyspnea, wheezing, and chest tightness, often accompanied by heightened psychological distress. Anxiety is not merely a secondary response but a clinically relevant comorbidity that can exacerbate bronchoconstriction through neurophysiological pathways, including increased sympathetic activity and altered respiratory patterns (Avci et al., 2025). This bidirectional relationship between asthma and anxiety contributes to poorer disease control, increased frequency of ED visits, prolonged recovery, and reduced quality of life. In Indonesia, where access to integrated psychosomatic care in acute settings remains limited, addressing anxiety as part of asthma management is both clinically necessary and strategically relevant (Barkat et al., 2025).

Existing literature has consistently demonstrated that anxiety prevalence among asthma patients ranges from mild to severe levels, particularly during acute exacerbations (Bondarenko et al., 2025). Studies have identified that uncontrolled asthma symptoms, uncertainty of attacks, and previous hospitalization experiences contribute to psychological distress (Chu et al., 2025). Pharmacological management primarily targets airway inflammation and bronchospasm but does not directly address anxiety (Diogo Gonçalves, 2025). Consequently, there has been growing interest in non-pharmacological interventions, including relaxation-based therapies, cognitive-behavioral approaches, and breathing techniques. Among these, progressive muscle relaxation (PMR) has been widely studied for its physiological effects on reducing muscle tension, modulating autonomic nervous system activity, and enhancing parasympathetic dominance (Donato et al., 2026).

Empirical evidence suggests that PMR can reduce anxiety across various clinical populations, including patients with chronic illness, surgical conditions, and mental health disorders (G. et al., 2025). Mechanistically, PMR works by systematically tensing and relaxing muscle groups, which promotes awareness of bodily tension and induces a relaxation response mediated by decreased hypothalamic activation and reduced sympathetic output (Kwon et al., 2026). Some studies in respiratory populations indicate that PMR may improve breathing patterns, reduce respiratory rate, and enhance oxygen utilization efficiency (McCormick & Lamberson, 2024). However, the majority of these studies have been conducted in stable outpatient settings or chronic disease management contexts rather than acute emergency environments (LeBovidge & Schneider, 2025).

Despite these promising findings, critical gaps remain in the current body of knowledge. First, there is limited evidence specifically examining the effectiveness of PMR in acute care settings such as emergency departments, where patients experience heightened physiological and psychological stress simultaneously (McLay et al., 2024). Second, many existing studies employ heterogeneous methodologies, including small sample sizes, the lack of standardized anxiety measurement tools, and a lack of pre-post comparative statistical rigor (Mein & Ferrera, 2025). Third, research on asthma patients in developing-country contexts, particularly within Indonesian healthcare systems, remains scarce. These limitations restrict the generalizability and applicability of existing evidence to real-world emergency clinical practice (Miranda et al., 2024).

Furthermore, prior studies often emphasize long-term behavioral interventions rather than rapid, feasible techniques that can be implemented within the time constraints of emergency care. This creates a practical gap between theoretical effectiveness and clinical applicability. In

emergency settings, interventions must be simple, time-efficient, non-invasive, and easily administered by nursing staff without requiring extensive training or equipment. PMR potentially fulfills these criteria, yet its effectiveness in this specific context has not been sufficiently validated through structured experimental designs (Pampita et al., 2026).

The novelty of this study lies in its focus on evaluating the effectiveness of progressive muscle relaxation as an immediate, non-pharmacological intervention for reducing anxiety among asthma patients in an emergency department setting. Unlike previous research that primarily examines chronic or outpatient populations, this study applies PMR in an acute clinical environment characterized by high patient turnover and urgency of care. Additionally, this study employs a quasi-experimental one-group pretest–posttest design with standardized anxiety measurement, enabling a more robust assessment of intervention impact within a real-world clinical workflow. By integrating psychological intervention into emergency nursing practice, this research also contributes to the development of holistic, patient-centered care models.

Therefore, this study aims to determine the effect of progressive muscle relaxation therapy on reducing anxiety levels in asthma patients treated in the Emergency Department of Prembun Regional Hospital. The findings are expected to provide empirical evidence for integrating simple relaxation techniques into acute asthma management protocols, thereby improving both psychological and physiological outcomes in emergency care settings.

RESEARCH METHODOLOGY

Study Design

This study employed a quasi-experimental design using a one-group pretest–posttest approach. This design was selected to evaluate the immediate effect of progressive muscle relaxation (PMR) on anxiety levels in a real-world emergency department (ED) setting, where randomization and control-group allocation were not feasible due to ethical and operational constraints. The design allows within-subject comparison to detect changes before and after the intervention.

Setting & Participants

The study was conducted in the Emergency Department of Prembun Regional Hospital, Central Java, Indonesia, over one month in 2025. The target population comprised adult patients diagnosed with asthma who presented with anxiety symptoms. Inclusion criteria were: (1) confirmed diagnosis of asthma, (2) experiencing anxiety based on screening assessment, (3) aged 25–80 years, and (4) willing to participate. Exclusion criteria included: (1) patients with severe cognitive impairment or altered consciousness, (2) patients requiring immediate life-saving interventions, and (3) patients with comorbid psychiatric disorders under active treatment.

Participants were selected using purposive sampling to ensure eligibility based on predefined clinical and demographic criteria. The sample size ($n = 28$) was determined using a paired mean-difference formula, with a 95% confidence level, 80% power, and an estimated moderate effect size derived from prior similar studies. This number was considered sufficient to detect statistically significant differences in pre- and post-anxiety scores.

Variables & Measurement

The independent variable was progressive muscle relaxation therapy, operationally defined as a structured sequence of muscle contraction and relaxation exercises administered according to a standardized protocol. The dependent variable was anxiety level, measured using the State-Trait Anxiety Inventory Short Form (STAIS-5), which yields a numerical score categorized into

no anxiety, mild, moderate, and severe anxiety levels. The STAIS-5 instrument has demonstrated acceptable psychometric properties in prior studies, with reported Cronbach's alpha >0.80, indicating good internal consistency. Content validity was established through expert review in nursing and psychological assessment domains. Data collected in this study were primary data obtained directly from participants.

Data Collection

Data collection was conducted in three stages: (1) baseline assessment of anxiety (pretest), (2) administration of PMR intervention guided by trained nursing personnel, and (3) post-intervention anxiety assessment (posttest). The PMR procedure followed standardized steps involving sequential muscle groups and controlled breathing, delivered in a quiet environment within the ED setting. Quality control measures included standardized training for data collectors, use of uniform instructions, calibration of assessment timing, and verification of questionnaire completeness. Data consistency was checked daily to minimize recording errors.

Data Analysis

Descriptive statistics were used to summarize participant characteristics and distributions of anxiety levels, presented as frequencies, percentages, means, and standard deviations. Bivariate analysis was performed using a paired sample t-test to compare pretest and posttest anxiety scores. Although the primary design focused on within-subject comparison, exploratory multivariate analysis using linear regression was conducted to assess the potential influence of demographic variables (age and sex) on changes in anxiety scores. All statistical analyses were performed using SPSS software version 25.0. A significance level of $\alpha = 0.05$ was applied for all inferential tests.

Ethical Approval

This study received ethical clearance from the Health Research Ethics Committee of Sekolah Tinggi Ilmu Kesehatan Pemkab Purworejo, Indonesia, with approval number 27/WK. I /SPP/V/2025. All participants provided written informed consent before data collection. Confidentiality and anonymity were maintained throughout the study, and participants were informed of their right to withdraw at any time without consequences.

RESULT

This section presents the key findings on changes in anxiety levels among asthma patients before and after the administration of progressive muscle relaxation therapy. The results are organized to include participant characteristics, the distribution of anxiety levels at pre-test and post-test, and the statistical analysis of the intervention effect. This structured presentation provides clear empirical evidence of the intervention's effectiveness within the emergency department clinical setting.

Table 1. Demographic Characteristics of Respondents (n = 28)

Variable	Category	Frequency (n)	Percentage (%)	Valid (%)	Cumulative (%)
Sex	Male	13	46.4	46.4	46.4
	Female	15	53.6	53.6	100.0
	Total	28	100.0	100.0	-
Age (years)	≤35	4	14.3	14.3	14.3
	36–45	2	7.1	7.1	21.4
	46–55	6	21.4	21.4	42.9
	56–65	5	17.9	17.9	60.7
	66–75	9	32.1	32.1	92.9
	≥76	2	7.1	7.1	100.0
	Total	28	100.0	100.0	-

Most respondents were female (53.6%). The largest age group was 66–75 years (32.1%). The youngest respondent was 28 years old, and the oldest was 77, with a mean age of 57.

Table 2. Distribution of Anxiety Levels Pre- and Post-Intervention (n = 28)

Anxiety Level (Score)	Frequency (n)	Percentage (%)	Valid (%)	Cumulative (%)
Pre-Test				
Mild (30–37)	9	32.1	32.1	32.1
Moderate (38–44)	7	25.0	25.0	57.1
Severe (45–80)	12	42.9	42.9	100.0
Total	28	100.0	100.0	-
Post-Test				
No Anxiety (20–29)	13	46.4	46.4	46.4
Mild (30–37)	6	21.4	21.4	67.9
Moderate (38–44)	7	25.0	25.0	92.9
Severe (45–80)	2	7.1	7.1	100.0
Total	28	100.0	100.0	-

Before the intervention, most respondents experienced severe anxiety (42.9%). After progressive muscle relaxation therapy, the majority shifted to the no anxiety category (46.4%), indicating a substantial reduction in anxiety levels. Table 1. Effect of Progressive Muscle Relaxation on Anxiety Levels.

Table 3. Paired Sample Analysis of Anxiety Scores (n = 28)

Variable		Mean		SD	Std. Error		
Pre-Test		3.10		0.875	0.165		
Post-Test		1.92		1.015	0.191		
Paired Comparison	Mean Difference	SD	Std. Error	95% CI (Lower–Upper)	t	df	p-value
Pre–Post	1.178	0.722	0.136	0.898 – 1.458	8.856	27	<0.001
Correlation			N	r	p-value		
Pre–Post			28	0.717	0.002		
Rank Test			N	Mean Rank	Sum of Ranks		
Negative Ranks (Decrease)			25	13.00	325.00		
Positive Ranks (Increase)			0	0.00	0.00		
Ties			3				
Total			28				

The results indicate a statistically significant reduction in anxiety levels following the intervention. The mean anxiety score decreased from 3.10 (SD = 0.875) before therapy to 1.92 (SD = 1.015) after therapy, with a mean difference of 1.178 (95% CI: 0.898–1.458; $p < 0.001$). The high t-value (8.856) confirms a strong treatment effect. A significant positive correlation ($r = 0.717$; $p = 0.002$) suggests consistency between pre- and post-test scores. Additionally, 25 out of 28 participants showed decreased anxiety levels, with no increases observed, indicating that progressive muscle relaxation therapy is highly effective in reducing anxiety among asthma patients.

DISCUSSION

This study provides evidence that progressive muscle relaxation (PMR) is not merely an adjunctive relaxation technique but represents a clinically meaningful intervention capable of addressing the psychophysiological interplay inherent in acute asthma exacerbations. The anxiety reduction observed in this study should be interpreted beyond statistical significance, as it reflects a disruption of the feedback loop between psychological distress and respiratory dysfunction. Anxiety in asthma is not a passive comorbidity; rather, it actively contributes to symptom amplification through increased sympathetic activation, altered breathing patterns, and heightened perception of dyspnea. By inducing parasympathetic dominance and reducing somatic tension, PMR operates at the intersection of psychological regulation and physiological

stabilization, thereby offering a mechanism-based intervention aligned with the biopsychosocial model of care.

From a conceptual standpoint, these findings reinforce the need to reposition anxiety management as an integral component of acute asthma care rather than a secondary or optional consideration (Patidar et al., 2025). Emergency care systems are traditionally oriented toward rapid physiological stabilization, often prioritizing pharmacological interventions such as bronchodilators and corticosteroids (Prather et al., 2025). While these treatments are essential, they do not address the cognitive-emotional processes that can perpetuate respiratory distress. The demonstrated effectiveness of PMR suggests that integrating structured psychological interventions into emergency protocols can enhance overall treatment efficacy by simultaneously targeting both biological and behavioral determinants of health (Rafael Henriques et al., 2024).

The implications of this study extend to the reconfiguration of nursing roles within emergency settings. Nurses are strategically positioned to deliver brief, non-invasive interventions such as PMR, which require minimal resources yet yield significant therapeutic benefits (Rasi Rahagia & Dewi Nurhanifah, 2026). Embedding PMR into routine nursing practice may contribute to a more holistic model of care, where emotional regulation is addressed alongside physical symptoms (Rodrigues et al., 2026). This shift has the potential to improve patient experience, reduce perceived distress, and possibly shorten recovery time, thereby optimizing workflow efficiency in high-demand emergency environments.

In addition, the findings highlight the importance of developing standardized clinical pathways that incorporate non-pharmacological interventions (Sepúlveda-Loyola et al., 2025). The absence of such protocols often leads to variability in care and underutilization of effective, low-cost strategies (Zouki et al., 2026). By establishing PMR as part of evidence-based emergency care guidelines, healthcare systems can promote consistency in practice while enhancing patient-centered outcomes (Sher et al., 2024). This approach aligns with broader healthcare trends emphasizing integrative care models and the optimization of resource utilization, particularly in settings with limited access to specialized psychological services (Suprpto & Kadang, 2026).

Despite its contributions, this study must be interpreted within the context of its methodological constraints (Tschenett et al., 2026). The absence of a control group limits causal inference, and the relatively small sample size may affect generalizability. Furthermore, the reliance on self-reported measures introduces the possibility of subjective bias, particularly in an environment characterized by acute stress (Us et al., 2025). These limitations suggest that while the findings are promising, they should be viewed as part of an emerging evidence base rather than definitive conclusions (Xu et al., 2026).

Future research should aim to strengthen the evidence through randomized controlled designs and larger, multicenter samples. Incorporating objective physiological indicators, such as respiratory parameters and autonomic markers, would provide a more comprehensive understanding of the mechanisms underlying PMR (Zhang et al., 2025). Longitudinal studies are also needed to assess whether the observed reductions in anxiety translate into sustained clinical benefits, such as reduced exacerbation recurrence or improved treatment adherence. This study contributes to the evolving discourse on integrative emergency care by demonstrating that addressing psychological dimensions of illness can yield measurable clinical benefits. The incorporation of PMR into asthma management protocols represents a practical and theoretically grounded strategy to enhance care quality. By bridging the gap between physiological treatment and psychological support, healthcare providers can move toward a more comprehensive and responsive model of emergency care that acknowledges the complex, interconnected nature of human health.

CONCLUSION

This study aimed to evaluate the effect of progressive muscle relaxation (PMR) on anxiety levels among asthma patients in an emergency department setting. The findings indicate that PMR contributes to a meaningful reduction in patient anxiety, reflected in the shift from higher anxiety categories before intervention to lower or absent anxiety after therapy. This pattern underscores the clinical relevance of addressing psychological distress as part of acute asthma management. PMR emerges as an effective, safe, and practical non-pharmacological intervention that can be implemented within routine emergency care without additional resources. As a brief and low-cost technique, it complements pharmacological treatment by targeting the psychological dimension of asthma exacerbations, which is often under-recognized in acute clinical settings. From a policy and practice perspective, integrating PMR into emergency nursing protocols and clinical guidelines is recommended to support more holistic patient care. Strengthening staff capacity through training in simple relaxation techniques may enhance patient comfort, reduce anxiety-related complications, and improve overall care efficiency in emergency departments.

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This research received no external funding and was conducted independently by the authors.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this study.

Authors' Contributions

Ahmad Muzaki: Conceptualization, Methodology, Data Curation, Formal Analysis, Investigation, Writing – Original Draft.

Bayu Seto Rindi Atmojo: Supervision, Validation, Writing – Review & Editing.

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Declaration of Generative AI Use

The authors declare that generative artificial intelligence tools were used only to assist in language refinement and manuscript structuring. All scientific content, data analysis, and interpretation remain the sole responsibility of the authors.

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