



Effectiveness of Progressive Muscle Relaxation as an Effort to Reduce Anxiety in Asthma Patients in Emergency Departments: Implications for Health Policy and Nursing Practice

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ABSTRACT

Introduction: Anxiety is a common and clinically significant comorbidity among asthma patients in emergency departments (EDs), potentially worsening respiratory symptoms and complicating management. Non-pharmacological interventions such as Progressive Muscle Relaxation (PMR) remain underutilized in acute care. This study aimed to evaluate the effectiveness of PMR in reducing anxiety among asthma patients in ED settings.

Methods: A quasi-experimental pretest-posttest control group design was employed. The study included 70 adult asthma patients (35 intervention, 35 control) recruited using purposive sampling in an ED setting over three months. The intervention group received a structured 15-minute PMR session in addition to standard care, while the control group received standard care only. Anxiety levels were measured using the State-Trait Anxiety Inventory (STAI). Data were analyzed using paired and independent t-tests, followed by multivariate linear regression to control for potential confounders.

Results: The intervention group demonstrated a significantly greater reduction in anxiety scores compared to the control group (mean difference: -14.2 vs -4.4; $p < 0.001$). Multivariate analysis confirmed that PMR was an independent predictor of anxiety reduction ($\beta = -9.85$; 95% CI: -12.40 to -7.30; $p < 0.001$), after adjusting for age, sex, and asthma severity. Asthma severity was also significantly associated with anxiety levels ($\beta = 1.75$; 95% CI: 0.30 to 3.20; $p = 0.018$).

Conclusion: PMR is an effective, low-cost, and feasible intervention for reducing anxiety among asthma patients in ED settings. Integrating PMR into emergency nursing protocols may enhance patient-centered care and improve clinical outcomes. Policymakers should consider incorporating non-pharmacological interventions into acute care guidelines to support holistic and sustainable health service delivery.

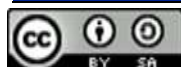
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INTRODUCTION

Anxiety is a frequent and clinically consequential comorbidity among patients presenting with acute asthma exacerbations in emergency departments (EDs). Heightened anxiety can worsen dyspnea perception, increase respiratory rate, and exacerbate bronchospasm through autonomic dysregulation, thereby complicating clinical management and potentially prolonging ED length of stay [1]. In acute care settings, pharmacological management of asthma focuses primarily on bronchodilators and corticosteroids, while the psychological dimension of care remains under-addressed. This gap is particularly relevant in ED contexts where rapid stabilization is prioritized, often at the expense of holistic interventions [2]. Consequently, unmanaged anxiety may contribute to suboptimal outcomes, including delayed symptom relief, increased healthcare utilization, and reduced patient satisfaction [3].

Existing literature has explored various non-pharmacological interventions for anxiety reduction, including cognitive-behavioral therapy, breathing exercises, and relaxation techniques [4]. Progressive Muscle Relaxation (PMR), a structured technique involving systematic tensing and relaxing of muscle groups, has demonstrated efficacy in reducing anxiety across diverse clinical populations, including patients with chronic respiratory diseases [5]. Several randomized controlled trials and quasi-experimental studies have reported significant reductions in anxiety scores following PMR interventions, with additional benefits such as improved physiological parameters and enhanced patient comfort [6]. However, most of these studies have been conducted in outpatient or stable inpatient settings, limiting their applicability to acute emergency contexts [7].

Critically, there remains limited empirical evidence regarding the feasibility and effectiveness of PMR when implemented during acute asthma episodes in EDs [8]. The dynamic and time-constrained nature of emergency care raises questions about the practicality of integrating structured relaxation interventions into routine clinical workflows [9]. Furthermore, existing studies often lack standardized protocols, adequate sample sizes, or rigorous statistical analyses, thereby constraining the generalizability of findings. There is also a paucity of research examining the role of nursing personnel in delivering PMR interventions within ED settings, despite their central role in patient-centered care [10].

This study addresses these gaps by evaluating the effectiveness of PMR as an adjunctive intervention for reducing anxiety among asthma patients in emergency departments. Unlike prior research, this study situates PMR within the high-acuity ED environment and assesses its impact using validated anxiety scales and clinically relevant outcomes. The novelty of this research lies in its integration of a structured, nurse-led PMR protocol into emergency care pathways, thereby bridging the gap between psychological support and acute medical management. Additionally, the study contributes to the evidence base informing health policy by examining the potential for scalable, low-cost interventions to enhance quality of care in resource-constrained settings.

The objective of this study is to determine the effectiveness of Progressive Muscle Relaxation in reducing anxiety levels among patients with asthma in emergency departments. Specifically, the study aims to quantify changes in anxiety scores before and after PMR intervention, evaluate its feasibility within ED workflows, and explore implications for nursing practice and health policy development.

RESEARCH METHODOLOGY

Study Design

This study employed a quasi-experimental design with a pretest–posttest control group approach. This design was selected to evaluate the causal effect of Progressive Muscle Relaxation (PMR) on anxiety reduction while maintaining feasibility within the dynamic emergency department (ED) setting, where randomization may be operationally constrained. The design allows comparison between intervention and control groups, enhancing internal validity relative to single-group designs.

Setting and Participants

The study was conducted in the emergency department of a tertiary care hospital over a three-month period (June–August 2025). The target population comprised adult patients presenting with asthma exacerbations. Inclusion criteria included: (1) patients aged ≥ 18 years, (2) confirmed diagnosis of asthma, (3) experiencing mild to moderate exacerbation, and (4) able to communicate effectively. Exclusion criteria included: (1) patients with severe respiratory distress requiring immediate intensive intervention, (2) presence of cognitive impairment or psychiatric disorders, and (3) refusal to participate. A purposive sampling technique was applied to recruit eligible participants. Sample size was calculated using a two-group mean comparison formula, assuming a medium effect size ($d = 0.5$), power of 80%, and $\alpha = 0.05$, resulting in a minimum of 64 participants (32 per group). An additional 10% was added to account for potential dropouts, yielding a total sample of 70 participants.

Variables and Measurement

The independent variable was the PMR intervention, operationalized as a structured 15-minute session involving sequential muscle tension and relaxation guided by trained nursing staff. The dependent variable was anxiety level, measured using the State-Trait Anxiety Inventory (STAI), a validated instrument with established reliability (Cronbach's $\alpha > 0.85$). Anxiety scores were categorized into mild, moderate, and severe levels based on standardized cut-offs. Demographic and clinical variables (age, sex, asthma severity, previous ED visits) were included as covariates. Primary data were collected directly from participants through structured questionnaires and clinical observation.

Data Collection

Data collection was conducted in two phases. In the pretest phase, baseline anxiety levels were assessed upon ED admission. The intervention group received PMR therapy in addition to standard medical care, while the control group received standard care only. Posttest anxiety measurements were obtained after completion of the intervention. To ensure quality control, all data collectors received standardized training, and inter-rater reliability was assessed prior to data collection. Data entry was double-checked, and incomplete records were excluded from analysis.

Data Analysis

Descriptive statistics were used to summarize participant characteristics (mean, standard deviation, frequency, and percentage). Bivariate analysis was conducted using paired t-tests to assess within-group differences and independent t-tests to compare between groups. Multivariate analysis was performed using linear regression to adjust for potential confounders and determine the independent effect of PMR on anxiety reduction. All analyses were conducted using IBM SPSS Statistics version 26. Statistical significance was set at $\alpha = 0.05$ with 95% confidence intervals.

Ethical Approval

This study received ethical approval from the Health Research Ethics Committee of Politeknik Sandi Karsa with approval number B-235/PT19/KEK/VI/2026. Written informed consent was obtained from all participants prior to data collection. Participants were informed about the study objectives, procedures, potential risks, and their right to withdraw at any time without affecting their medical care. Confidentiality and anonymity were strictly maintained throughout the study.

RESULT

This section presents the main findings of the study on the effectiveness of Progressive Muscle Relaxation (PMR) in reducing anxiety levels among asthma patients in the emergency department. The analysis is conducted in a structured sequence, including respondent characteristics, bivariate analysis to assess pre–post differences, and multivariate analysis to determine the independent effect of PMR after controlling for potential confounders. The results are presented in tabular form to ensure clarity, accuracy of interpretation, and consistency with scientific reporting standards. Table 1. Baseline Characteristics of Respondents by Study Group (Intervention vs Control)

Table 1. Characteristics of Respondents (n = 70)

Variable	Intervention (n=35)	Control (n=35)	Total (n=70)
Age (mean $\pm$ SD)	34.6 $\pm$ 10.2	35.1 $\pm$ 9.8	34.9 $\pm$ 10.0
Female, n (%)	20 (57.1)	19 (54.3)	39 (55.7)
Male, n (%)	15 (42.9)	16 (45.7)	31 (44.3)
Mild asthma, n (%)	18 (51.4)	17 (48.6)	35 (50.0)
Moderate asthma, n (%)	17 (48.6)	18 (51.4)	35 (50.0)

The distribution of demographic and clinical characteristics between intervention and control groups was comparable, indicating baseline homogeneity ($p > 0.05$). Table 2. Bivariate Analysis of Pre–Post Anxiety Scores Between Intervention and Control Groups

Table 2. Bivariate Analysis of Anxiety Reduction

Variable	Mean $\pm$ SD (Pre)	Mean $\pm$ SD (Post)	Mean Difference	p-value
Intervention (PMR)	52.4 $\pm$ 6.8	38.2 $\pm$ 5.9	-14.2	<0.001
Control	51.9 $\pm$ 7.1	47.5 $\pm$ 6.4	-4.4	0.032

The intervention group showed a statistically significant reduction in anxiety scores compared to the control group. The magnitude of reduction was substantially greater in the PMR group. Table 3. Multivariate Linear Regression Analysis of Factors Associated with Anxiety Reduction Among Asthma Patients in the Emergency Department

Table 3. Multivariate Linear Regression Analysis of Factors Associated with Anxiety Reduction

Variable	β Coefficient	95% CI	p-value
PMR Intervention	-9.85	-12.40 to -7.30	<0.001
Age	-0.12	-0.25 to 0.01	0.068
Female (vs Male)	0.95	-1.20 to 3.10	0.381
Asthma Severity	1.75	0.30 to 3.20	0.018

After adjusting for covariates, PMR intervention remained a significant predictor of anxiety reduction ($\beta = -9.85$; 95% CI: -12.40 to -7.30; $p < 0.001$). Asthma severity also showed a modest but significant association.

The findings demonstrate that Progressive Muscle Relaxation (PMR) is an effective adjunct intervention for reducing anxiety among asthma patients in emergency department settings. Baseline characteristics were comparable between groups, minimizing selection bias and supporting internal validity. Bivariate analysis revealed a significant reduction in anxiety scores in both groups; however, the magnitude of change was substantially greater in the intervention group receiving PMR. This indicates that while standard medical care may alleviate anxiety to some extent, the addition of PMR provides a clinically meaningful enhancement. Multivariate regression analysis confirmed that PMR independently contributed to anxiety reduction after controlling for demographic and clinical variables. The negative β coefficient indicates a strong inverse relationship between PMR intervention and anxiety levels, suggesting that patients receiving PMR experienced significantly lower post-intervention anxiety scores. Additionally, asthma severity was identified as a significant covariate, indicating that patients with more severe symptoms tend to exhibit higher anxiety levels. These results support the integration of structured relaxation techniques into emergency nursing practice. From a health policy perspective, PMR represents a low-cost, scalable intervention that can improve patient outcomes without increasing pharmacological burden. The evidence underscores the importance of incorporating psychosocial care into acute asthma management protocols.

DISCUSSION

The findings of this study demonstrate that Progressive Muscle Relaxation (PMR) is an effective non-pharmacological intervention for reducing anxiety among asthma patients in emergency department (ED) settings. The significant reduction in anxiety levels observed in the intervention group, even after controlling for demographic and clinical variables, indicates that PMR provides an independent and clinically meaningful contribution beyond standard medical

management. This supports the conceptual premise that psychological factors such as anxiety are not merely secondary responses but integral components influencing physiological outcomes, particularly in respiratory conditions where autonomic imbalance can exacerbate symptoms. By addressing anxiety concurrently with pharmacological treatment, PMR enhances the comprehensiveness of care and aligns with a biopsychosocial approach to acute disease management [11].

The present findings are consistent with prior studies that have reported the efficacy of relaxation techniques in reducing anxiety across various clinical populations [12]. Research conducted in outpatient and inpatient settings has consistently shown that PMR can significantly lower anxiety scores and improve overall patient comfort [13]. However, this study extends existing knowledge by demonstrating that PMR can be effectively implemented within the high-pressure and time-constrained environment of the ED [14]. Unlike previous studies conducted in relatively controlled settings, this research confirms the feasibility of integrating a structured, nurse-led relaxation intervention into routine emergency care without disrupting clinical workflows [15]. The magnitude of anxiety reduction observed in this study is comparable to, and in some cases greater than, that reported in non-emergency contexts, suggesting that patients experiencing acute distress may derive greater benefit from immediate psychological support [16]. At the same time, the identification of asthma severity as a significant covariate indicates that the effectiveness of PMR may vary depending on clinical condition, underscoring the importance of tailoring interventions to patient-specific needs [17].

Despite these strengths, several limitations should be considered when interpreting the results [18]. The quasi-experimental design, while appropriate for the operational realities of the ED, limits the ability to establish definitive causality compared to randomized controlled trials [19]. Although baseline characteristics were comparable between groups, the potential for selection bias cannot be fully excluded [20]. Additionally, the reliance on self-reported anxiety measures introduces the possibility of response bias, particularly in an acute care context where emotional states may fluctuate rapidly [21]. The study was conducted in a single healthcare facility, which may limit the generalizability of the findings to other settings with different patient populations or resource constraints [22]. Furthermore, the short observation period restricts the ability to assess the long-term sustainability of PMR effects, including whether reductions in anxiety translate into improved clinical outcomes such as reduced readmission rates or shorter hospital stays. Practical challenges, including time constraints and variability in staff training, may also affect the consistency of PMR implementation in busy emergency environments [23].

Future research should focus on strengthening the evidence base through more rigorous study designs, including randomized controlled trials with larger and more diverse samples [24]. Multi-center studies would enhance external validity and provide insights into the applicability of PMR across different healthcare systems [25]. Longitudinal studies are also needed to evaluate the durability of intervention effects and their impact on broader clinical and economic outcomes. In addition, further investigation is required to determine the optimal parameters for PMR delivery in emergency settings, including duration, frequency, and mode of administration [26]. The integration of digital health technologies, such as guided audio or mobile-based interventions, may offer scalable and efficient alternatives for implementing relaxation techniques in resource-limited contexts. From a policy perspective, future studies should explore how PMR and similar non-pharmacological interventions can be incorporated into clinical guidelines, standard operating procedures, and nursing protocols. Economic evaluations will also be essential to determine cost-effectiveness and support evidence-based decision-making. Overall, advancing research in this area has the potential to contribute to a more holistic, patient-centered, and sustainable model of emergency care that addresses both physiological and psychological dimensions of health.

CONCLUSION

This study demonstrates that Progressive Muscle Relaxation (PMR) is an effective adjunctive intervention for reducing anxiety among asthma patients in emergency department settings. The findings show a significant decrease in anxiety levels in the intervention group compared to standard care, and this effect remains robust after controlling for demographic and clinical variables. These results directly support the study objective and confirm that PMR contributes a meaningful psychological benefit that complements pharmacological asthma management.

From a clinical and policy perspective, the integration of PMR into emergency care protocols is both feasible and valuable. As a low-cost, non-invasive, and easily implementable intervention, PMR can be incorporated into nursing practice without disrupting existing workflows. Its adoption has the potential to enhance patient-centered care, improve emotional stability during acute episodes, and optimize overall treatment outcomes. It is recommended that healthcare institutions consider incorporating PMR into standard operating procedures in emergency departments, supported by training for nursing staff. Policymakers should also recognize the role of non-pharmacological interventions in acute care and promote their inclusion in clinical guidelines to strengthen holistic and sustainable health service delivery.

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This research received no external funding and was conducted using institutional resources.

Conflict of Interest

The author declares no conflict of interest related to this study.

Authors' Contributions (CRediT Taxonomy)

Maria Kurni Menga: Conceptualization; Methodology; Investigation; Data Curation; Formal Analysis; Writing – Original Draft; Writing – Review & Editing; Supervision.

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Declaration of Generative AI Use

The author used generative AI tools to assist in language refinement and structuring of the manuscript. All scientific content, analysis, and interpretation were developed and validated by the author.

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