

Original Article

Effect of Combination of Different Postures and Pursed Lips Breathing on Dyspnea and Pulmonary Parameters among Patients with Asthma

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Pursed Lips Breathing on Dyspnea and Pulmonary Parameters with Asthma

ABSTRACT

Objective: To evaluate the effects of combining prostration position with pursed-lip breathing in adult asthma patients.

Study Design: A quasi-experimental study

Place and Duration of Study: This study was conducted at the Emergency Department, Imam Hussein Medical City Karbala from 1st April 2025 to 30th September 2025.

Methods: 60 patients of intervention n=30 and control n=30. The patient's contribution to the study was positive, as the nursing intervention was implemented by the patient himself.

Results: The intervention group demonstrated significant improvements: respiratory rate decreased from (24.7) to (20.1) breaths/min ($p=0.001$), SpO₂ increased from 91.7% to 93.5% ($p<0.001$), and dyspnea scores reduced from 15.4 to 14.1 ($p=0.014$). No significant changes occurred in controls. Participants were predominantly middle-aged (46.7-50% aged 30-49), obese (36.7% Class I), with chronic asthma (40% duration 11-20 years) using ICS+LABAs (40%).

Conclusion: Prostrate position enhances diaphragmatic function and pursed-lip breathing reduces hyperinflation, supporting their integration into asthma care and education as a safe, effective intervention.

Key Words: Asthma, Prostration, Pursed-lip breathing

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INTRODUCTION

Chronic inflammation and edema of the airway mucosa, along with bronchial hyperresponsiveness, characterize asthma. Histamine and leukotrienes are released by triggers, causing symptoms. Some experience intermittent symptoms, while others may have long-term airway remodeling, leading to reduced lung function. Asthma patients may face coughing, dyspnea, wheezing, chest tightness, tachypnea, and nighttime or early morning coughing.¹

Asthma caused 397,150 deaths worldwide in 2015, including in the Middle East. In Iraq, the prevalence of allergies and asthma has increased due to factors such as electrical generators, oil pollution, vehicle emissions, and explosions.²

While there is a correlation between certain traits and asthma, the condition affects individuals of all ages and sexes. Men typically experience higher prevalence in youth, while women are more likely to develop severe asthma during adolescence.³ The economic impact of asthma on the United States is substantial. In the most recent survey, the total cost of asthma was \$82 billion. Today, the predicted total cost is significantly greater.⁴ Asthma incidence and prevalence are increasing, but regular use of inhaled corticosteroids reduces mortality and prevents the side effects of oral corticosteroids, while improving symptom control. New treatments and specific therapeutic targets are needed for severe asthma.⁵ Current studies on non-pharmacological asthma therapies are insufficient. We propose research to evaluate the effects of prostrating on dyspnea relief and pulmonary parameters in adult asthma patients.

METHODS

A quasi-experimental study was conducted at Emergency Department, Imam Hussein Medical City Karbala from 1st April 2025 to 30th September 2025 letter No. 77 dated 24-3-2025 with (non-equivalent pretest-posttest control-group) on 60 patients with asthma who selected purposively (non-probability sample) and divided into 2 groups (control and

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prostrate), 30 patients in each groups. Data was collected from three groups before the interventional procedure and re-evaluated dyspnea level and pulmonary parameters for patients in the study group (prostrate) after asked them to do the pursed lip breathing exercise 3 times in a row, then apply the prostrate position for 5 minutes, and then re-apply the pursed lip breathing exercise 3 times in a row. The hospitalized patients who were already diagnosed with asthma, both male and female sex, those who had dyspnea, and patients who are willing to participate were included. The participants in the experimental study, asthma patients who did not have shortness of breath and who refused to participate, children under the age of 18, the elderly who could not tolerate prone positions, individuals with mental disabilities, severe heart and lung conditions, pregnant women, and patients with fever were excluded. The prostrate position of the patient lies down so that his knees, forehead, and hands are close to the ground and the elbows are flexed and relaxed to bear the weight of the patient. The abdominal area remains unsupported so that the position of the patient is the same as the position of prostrate during prayer .The researcher measured the pulmonary parameters on his own and entered them into the study instrument as part of the interview approach used for data collection. The data was entered and analyzed through SPSS-24.

RESULTS

The mean of the patients’ age was 54.4±14 years. 46.7% of the patients in control group and 50% of them in prostrate group were age of (30-49) years. Males of the control and prostrate group were 53.3%, and 56.7%

respectively. 36.7% of control group and 30% of prostrate group were educated. 40% of control group were retired and 23.3% of prostrate group were factory workers. 43.4% and 40% of asthmatic patients in control and prostrate groups were previously smokers. Since all p-values are above the typical significance threshold (0.05), there are no statistically significant differences in demographic characteristics between the control and prostrate groups (Table 1).

There were 36.7% and 30% of the patients in the control and prostrate group had obesity class I. Also it revealed that 36.7%and 40% of the patients in the control and prostrate group had 11-20 years duration of suffering from asthma. 40% of patients in each group (control and prostrate) were use Inhaled (ICS) & (LABAs) as a chronic medication use for asthma. 53.3% and 63.3% of the patients in the control and prostrate group had non-allergic asthma attack. There are no statistically significant (>0.05) differences (Table 2).

There is no statistically significant (p=.0926) difference in respiratory rate between pretest and posttest in the control group while there is a significant (.001) difference in the experimental group (prostrate group). There is no statistically significant (.582) difference in SPO₂ between pretest and posttest in control group while there is a significant difference (.000) in prostrate group (Table 3).

There is no statistically significant difference in dyspnea between pretest and posttest in the control group (df = 29, t= .368, p value of .715) while there is a clear difference at the (df= 29, t= 2.601, p value of .014) in the prostrate group (Table 4).

Table No. 1: Demographical characteristics of the asthmatic patients

Characteristics		Control Group		Prostate Group		P value
		No.	%	No.	%	
Age (years)	30-49	14	46.7	15	50.0	.346
	50-69	11	36.7	12	40.0	
	≥ 70	5	16.6	3	10.0	
Gender	Male	16	53.3	17	56.7	.542
	Female	14	46.7	13	43.3	
Educational level	Illiterate	-	-	-	-	.218
	Educated	11	36.7	9	30.0	
	Primary	6	20.1	8	26.7	
	Intermediate	9	30.0	8	26.7	
	Institute	2	6.7	2	6.6	
	Collage or more	2	6.7	3	10.0	
Occupation	Construction Workers	4	13.3	3	10.0	.976
	Factory Workers	4	13.3	7	23.3	
	Cleaners and Janitors	4	13.3	4	13.3	
	Agriculture Workers	3	10.0	3	10.0	
	Retired	12	40.1	7	23.4	
	Housewife	3	10.0	6	20.0	

Table No. 2: Distribution of the asthmatic patients according their clinical data

Clinical data		Control Group		Prostate Group		P value
		No.	%	No.	%	
Body mass index	Normal	5	16.7	8	26.7	.489
	Overweight	4	13.2	5	16.7	
	Obesity I	11	36.7	9	30.0	
	Obesity II	8	26.7	7	23.3	
	Obesity III	2	6.7	1	3.3	
Duration of suffering from asthma (years)	1-10	8	26.7	10	33.3	.744
	11-20	11	36.7	12	40.0	
	≤ 21	11	36.7	8	26.7	
Chronic medication use for asthma	Inhaled Corticosteroids (ICS)	3	10.0	3	10.0	.218
	Long-acting beta-agonists	11	36.7	11	36.7	
	Short-acting beta-agonists (LABAs)	2	6.6	3	10.0	
	Inhaled (ICS) + (LABAs)	12	40.0	12	40.0	
	Inhaled (ICS) + Leukotriene receptor antagonists (LTRAs)	2	6.6	1	3.3	
Type of current asthmatic attack	Allergic asthma	10	33.3	9	30.0	.386
	Non- allergic asthma	16	53.3	19	63.3	
	Exercise-induced asthma	4	13.3	2	6.7	

Table No. 3: Effect of combination of prostrate position with pursed lip breathing on pulmonary parameters

Group	Pulmonary parameters	Paired sample t test					
		Mean		df	t value	p value	Significant
		Pre-test	Post-test				
Control	RR	25.8	25.7	29	.093	.926	NS
	SPO ₂	92.2	92.3	29	5.56	.582	NS
Prostate	RR	24.7	20.1	29	3.65	.001	S
	SPO ₂	91.7	93.5	29	4.69	.000	S

Table No. 4: Effect of combination of prostrate position with pursed lip breathing on dyspnea levels

Group	Paired sample t test						
	Pre-test		Post-test		df	t value	p value
	Mean	SD	Mean	SD			
Control	15.6	2.3	15.3	2.1	29	.368	.715 (NS)
Prostrate	15.4	2.12	14.1	2.67	29	2.601	.014 (S)

DISCUSSION

The predominance of middle-aged participants (30-49 years) aligns with previous research indicating that asthma symptoms often worsen in adulthood due to prolonged exposure to environmental and occupational triggers.⁶ Additionally, the higher proportion of male participants (53.3% in control, 56.7% in prostration group) may reflect occupational exposures, as males in this study were frequently engaged in high-risk jobs (factory workers, construction). This demographic trend is consistent with studies linking occupational hazards to asthma exacerbations.⁷

The educational background of participants (with 30-36.7% classified as "educated") suggests that health literacy may have influenced adherence to breathing techniques. Prior research indicates that patients with

higher education levels are more likely to effectively implement self-management strategies, including PLB.⁸ However, the lack of illiterate participants in this study limits generalizability to lower-literacy populations, who may require additional nursing support for proper technique adherence.

A significant proportion of participants in both groups were classified as obese (Class I: 36.7% control, 30% prostration group; Class II-III: 33.4% control, 26.6% prostration group). Obesity is a well-documented comorbidity in asthma, contributing to worsened symptoms due to mechanical restriction of the lungs, chronic low-grade inflammation, and reduced response to standard therapies.⁹ The high prevalence of obesity in this cohort suggests that posture-based interventions, such as the prostration position, may be particularly beneficial, as forward-leaning postures can alleviate

diaphragmatic compression and improve ventilation efficiency.¹⁰

Most participants had suffered from asthma for over a decade (11-20 years: 36.7% control, 40% prostration group; ≥ 21 years: 36.7% control, 26.7% prostration group), indicating a population with persistent disease. Long-term asthma is often associated with airway remodeling and reduced lung function, necessitating advanced therapeutic strategies.¹¹ The majority of patients in both groups relied on combination therapy with inhaled corticosteroids (ICS) and long-acting beta-agonists (LABAs) (40% each), reflecting current Global Initiative for Asthma (GINA) guidelines for moderate-to-severe asthma. The comparable medication profiles between groups strengthen the validity of the prostration/PLB intervention, as confounding by differential medication use is minimized.

Non-allergic asthma was the most common phenotype (53.3% control, 63.3% prostration group), which aligns with studies showing increased prevalence of this subtype in adults, particularly those with obesity or long-standing disease.¹² Non-allergic asthma is often less responsive to standard bronchodilators and more reliant on adjunctive therapies (breathing exercises) to manage symptoms.¹³ The predominance of this phenotype supports the rationale for testing non-pharmacological interventions like prostration/PLB, which may improve symptoms through mechanical rather than immunological pathways.

The experimental group showed a clinically and statistically significant reduction in respiratory rate (RR) from 24.7 to 20.1 breaths per minute ($p=0.001$), while the control group maintained nearly identical RR values (25.8 vs 25.7, $p=0.926$). This 4.6 breath/minute reduction in the experimental group represents a substantial improvement, as a normal adult RR ranges from 12-20 breaths per minute. The magnitude of this effect surpasses that seen in similar studies of breathing techniques for COPD patients suggesting particular efficacy for asthma populations.¹⁰

The mechanism behind this improvement likely involves multiple factors: The forward-leaning prostration position reduces accessory muscle use and improves diaphragmatic efficiency.¹⁴ PLB helps regulate breathing patterns by preventing airway collapse during expiration.¹⁵ The combination may synergistically reduce dynamic hyperinflation, a key contributor to tachypnea in acute asthma.

The experimental group demonstrated significant SpO₂ improvement from 91.7% to 93.5% ($p<0.001$), while the control group showed no meaningful change (92.2% to 92.3%, $p=0.582$). This 1.8% increase, while numerically modest, represents an important clinical improvement for several reasons. It moves patients from the borderline hypoxemic range (91-94%) into the normal range ($\geq 95\%$) this results come along with

Abed-Ali et al¹⁶ and Abed-Ali and Athbi.¹¹ The improvement occurred without supplemental oxygen. Similar studies using only PLB have shown smaller effects (0.5-1.0% increases). The oxygenation benefit stems from improved ventilation-perfusion matching, reduced respiratory rate for efficient gas exchange, and larger effect sizes than seen in similar COPD studies.¹⁰ Greater improvements than reported for PLB alone in asthma¹⁷ and supports growing evidence for postural interventions in obstructive lung diseases.¹⁸

The experimental group showed a clinically meaningful decrease in dyspnea scores (from 15.4 ± 2.12 to 14.1 ± 2.67), indicating improved breathing comfort. This aligns with previous research showing that forward-leaning postures (such as the prostration position) reduce accessory muscle use and improve diaphragmatic efficiency, thereby decreasing the work of breathing.¹⁸ Pursed-lip breathing (PLB) further enhances this effect by slowing expiration, preventing airway collapse, and improving oxygenation.¹⁵ The control group's dyspnea levels remained nearly unchanged (15.6 ± 2.3 to 15.3 ± 2.1 , $p=0.715$), confirming that standard care alone does not significantly impact perceived breathlessness in the short term. A reduction in dyspnea is crucial because breathlessness is one of the most distressing symptoms for asthma patients, often leading to anxiety and worsened respiratory function.⁹ The prostration + PLB technique is a non-pharmacological, low-cost intervention easily taught by nurses and used by patients, reducing dyspnea by optimizing lung expansion and addressing hyperinflation in asthma, a common issue in asthma that contributes to breathlessness these results agrees with Abed-Ali and Athbi.¹¹ PLB prolongs exhalation, reducing air trapping and dynamic hyperinflation.¹⁰ Slow, controlled breathing (as in PLB) may reduce sympathetic overactivity and modulate cortical processing of dyspnea, making it feel less severe.¹⁹ Structured breathing techniques can reduce anxiety, which often exacerbates dyspnea.²⁰ Similar effects have been seen in COPD patients using PLB and postural adjustments¹⁸, but this study extends the evidence to asthma patients. The magnitude of dyspnea reduction (~ 1.3 points) is comparable to some bronchodilator studies, suggesting this could be a useful adjunct to medication.¹⁷

CONCLUSION

Combining the prostration position with pursed-lip breathing significantly improves respiratory rate, SpO₂, and dyspnea in adult asthma patients, offering a safe, non-pharmacological nursing intervention.

Recommendation: Integrating this technique into asthma self-management education, Training nurses to teach and supervise proper execution, and further research on long-term benefits in diverse asthma

populations. This intervention could enhance symptom control while reducing reliance on rescue medications.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Hayder Nawaf Abd Ali, Shatha Saadi Mohammed
Drafting or Revising Critically:	Hayder Nawaf Abd Ali, Shatha Saadi Mohammed
Final Approval of version:	All the above authors
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