



EFFECTIVENESS OF BUTEYKO BREATHING TECHNIQUE ON PULMONARY FUNCTION IN ADOLESCENTS WITH ASTHMA

Physiotherapy

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ABSTRACT

Background: Asthma is a major and prevalent worldwide health issue that can lead to major health complications, when left untreated. Buteyko breathing technique is an exercise to regulate the breathing process. **Aim:** To compare the effects of Buteyko breathing technique and Diaphragmatic breathing exercise on pulmonary functions in adolescents with asthma. **Methodology:** The present study comprised 50 subjects who were randomly assigned to two groups: Group A (n=25) received the Buteyko Breathing Technique(BBT), and Group B (n=25) received the Diaphragmatic Breathing Technique. Baseline and post-intervention values of Forced Vital Capacity (FVC) and Forced Expiratory Volume in One Second (FEV₁) were recorded. Intragroup analysis was conducted to evaluate the significance of changes within each group, while an independent t-test was employed to determine the statistical significance of differences between the groups. **Result and Discussion:** The results showed statistically significant difference with increase in FVC and FEV₁ in Group A who received BBT than diaphragmatic breathing exercise. **Conclusion:** Buteyko Breathing Technique has more effect on pulmonary functions in adolescents with asthma.

KEYWORDS

Asthma, Buteyko Breathing Technique, Diaphragmatic Breathing Exercise, Forced Vital Capacity

INTRODUCTION

Asthma is the second most common chronic respiratory disease and a leading cause of mortality¹. It involves airway inflammation, narrowing, and excess mucus production, leading to coughing, wheezing, shortness of breath, and chest tightness—often worse at night or early morning². Prevalence of adolescent asthma ranges from 5–20%, adding significantly to disease burden¹. Triggers include exposure to irritants and allergens, and severe attacks can be life-threatening³.

Airway obstruction in asthma is recurrent and reversible. During an asthma attack, airway constriction occurs due to inflammation of the bronchial lining and muscle spasms, limiting airflow in and out of the lungs. Although asthma cannot be cured, proper management can effectively control symptoms and allow individuals to maintain a good quality of life. However, it is often under diagnosed and under treated, leading to lifelong activity limitations and a significant burden on patients and their families⁴.

Pulmonary function tests (PFTs) play a vital role in assessing and monitoring respiratory conditions. They typically evaluate spirometric parameters such as FEV₁, FVC, the FEV₁/FVC ratio, and the flow-volume loop. FEV₁ is widely used to assess lung mechanics, whereas FVC reflects lung volume⁵.

Breathing exercises are widely used as a non-pharmacological therapy for asthma. They focus on improving tidal and minute volume, promoting relaxation, nasal and diaphragmatic breathing, and correcting breathing patterns. Techniques such as pursed-lip breathing, Buteyko method, diaphragmatic breathing, and yoga helps to control hyperventilation symptoms and enhance respiratory efficiency⁶.

The Buteyko Breathing Technique (BBT) is a specific form of breathing therapy that has gained attention for asthma management, though strong research evidence supporting its effectiveness remains limited. BBT aims to reduce hyperventilation through controlled slow and reduced breathing, along with breath-holding phases called “control pauses” and “extended pauses.” These methods closely resemble techniques commonly used by respiratory physiotherapists to manage hyperventilation symptoms⁶. Therefore, this study aims to determine the effectiveness of the Buteyko Breathing Technique in improving respiratory function among adolescents with asthma.

AIMS AND OBJECTIVES

1. To find out the effects of Buteyko breathing techniques in adolescents with asthma.
2. To find out the effects of diaphragmatic breathing exercises in adolescents with asthma.
3. To compare the effects of Buteyko breathing techniques and diaphragmatic breathing exercises in adolescents with asthma.

MATERIALS AND METHOD

- Study Design- Quasi-Experimental study
- Study Site - Senthil Multi-specialty Hospital in Devakottai, Tamilnadu
- Study Duration- October to December 2024
- Sample Size: 50

Inclusion Criteria:

- Age limits between 10-19 years
- Both males and females
- FVC <80% in PFT
- FEV₁ <70% in PFT

Exclusion Criteria:

- Smokers
- History of cardiac diseases, neurological diseases
- Chest wall or spinal deformity
- Subjects who practice yoga
- Non-cooperative subjects
- Subjects with thoraco-abdominal surgery
- Presence of any acute infection
- Any transplantation surgery
- Psychiatric illness

Procedure

50 asthmatic participants aged 10–19 years were selected based on inclusion and exclusion criteria, with informed consent obtained. They were randomly divided into two groups of 25: Group-A performed Buteyko Breathing Technique, and Group-B performed diaphragmatic breathing for 8 weeks. FVC and FEV₁ were used as outcome measures.

GROUP A

- Seat the patient in a comfortable sitting position.
- Instruct to breathe in and out normally 2–3 times.
- Take a small breath in for 2 seconds and a small breath out for 3 seconds.
- After exhaling, pinch the nose closed.
- Hold the breath while therapist counts one to three.
- Then release the breath.
- Then inhale, Resume normal breathing for 10 seconds and repeat the process up to 20 minutes

To prevent hyperventilation a 2-3 minutes rest period was given between 10 minutes.

GROUP B

- Seat the patient in a comfortable sitting position.
- subjects were instructed to breathe deeply through the nose while bringing the abdomen out
- Exhalation should also be relaxed and can be done through the nose or mouth.

- Repeat the process for 10 minutes

RESULTS

A total of 50 subjects participated in the study, in which [50%] were male and [50%] were female. Mean age and standard deviation (SD) for Group-A was 17.04 ± 1.69 and Group-B was 17.08 ± 1.38 .

Table 1: Pre & Post Treatment Comparison of Group-A and Group-B

		MEAN	SD	P-Value
FVC (GROUP A)	PRE	65.04	2.89	P<0.0001
	POST	78.64	4.17	
FVC (GROUP B)	PRE	60.16	2.80	P<0.0001
	POST	65.32	2.81	
FEV1 (GROUP A)	PRE	60.72	3.03	P<0.0001
	POST	71.20	2.40	
FEV1 (GROUP B)	PRE	58.4	4.16	P<0.0001
	POST	62.84	3.9	

Both Group A and Group B showed a significant improvement in FVC and FEV₁ values.

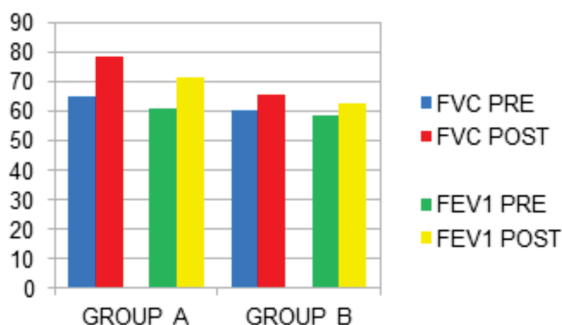


Figure 1: Comparison of Pre-test and Post-test FVC and FEV₁ Values Between Group A and Group B.

Table 2: Post-treatment Comparison Between Group-A and B

		MEAN	SD	t	P- Value
FVC	POST A	78.64	4.17	13.24	0.0001
	POST B	65.32	2.81		
FEV1	POST A	71.20	2.40	9.12	0.0001
	POST B	62.84	3.9		

In Table 2, the intergroup comparison of post-treatment FVC and FEV₁ values shows significant differences. Group A demonstrated notably higher scores in both parameters, indicating that BBT produced a more pronounced effect than diaphragmatic breathing exercises.

DISCUSSION

The purpose of the study was to find out the effectiveness of Buteyko breathing technique for adolescents with asthma. Bronchial asthma is a common and potentially serious chronic condition that imposes a considerable burden on patients, their families, and the community. Clinically, asthma is characterized by acute episodes of dyspnea, coughing, and wheezing that typically last from a few minutes to several hours (Fauci, 1998). In severe cases, these episodes may progress to complete airway obstruction and even death. The exact pathophysiological mechanism underlying the bronchial hyper-responsiveness seen in asthma remains incompletely understood, though it is widely believed to involve chronic airway inflammation⁷.

The key component of the Buteyko program is the reduction of hyperventilation through controlled breathing techniques, such as “slow breathing” and “reduced breathing,” along with deliberate breath-holding periods known as “control pauses” and “extended pauses.” Diaphragmatic breathing is encouraged, while the use of accessory respiratory muscles is discouraged. The technique may also incorporate physical activities designed to promote CO₂ retention⁸.

Additionally, the Buteyko method emphasizes the importance of nasal breathing over oral breathing. Nasal breathing not only warms, filters, and humidifies inspired air but also facilitates the production of nitric oxide—a potent bronchodilator that can help alleviate asthma symptoms⁹.

In this study FVC and FEV₁ increases after BBT and Diaphragmatic

breathing exercise. When compared between both the groups, results of our study showed that lung volumes were more marked with BBT than diaphragmatic exercise.

The BBT aims to reduce minute ventilation and thereby normalize carbon dioxide (CO₂) levels. Practitioners of this method propose that hyperventilation and the resulting hypocapnia play a major role in the pathophysiology of asthma. Consequently, by decreasing minute ventilation and restoring CO₂ balance, Buteyko breathing may help to alleviate or even reverse asthmatic symptoms.(Bowler 1998; Cooper 2003).

The major limitation of the study includes small sample size, only adolescents were selected and also study duration is less. Some of the major suggestions include: a large sample size is required to establish the accuracy of the study, comparison of effectiveness of exercise program in different age group can be done, study can be performed on specific population.

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