

# Effects of the Pole Striding Intervention Program on Cardiovascular Fitness among Bronchial Asthma Patients

Yogeshwaran L<sup>1</sup>, Rekha K<sup>2</sup>, Saravan Kumar J<sup>3</sup>,  
Preethi G<sup>4</sup>, Kabilan R<sup>5</sup>, Muthu Lakshmi T<sup>6</sup>

<sup>1,6</sup>Post Graduate, <sup>2</sup>Associate Professor, <sup>3</sup>Assistant Professor, <sup>4,5</sup>Tutor, Saveetha college of physiotherapy, Saveetha Institute Of Medical & Technical Sciences, Chennai, Tamil Nadu, India.

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## Abstract

**Background:** Chronic inflammatory illnesses of the airways, such as bronchial hyper-reactivity and varying degrees of airway blockage, are known as bronchial asthma. Pole walking is a low-impact fitness walking using specially designed, light weighted pole. Nordic walking is a common outdoor physical activity. So in this study we are going to find out the effectiveness of pole striding in bronchial asthma.

**Aim:** The aim of the analysis is to appraise the impact of the pole striding intervention program on bronchial asthma, with regard to the potential improvements in cardiovascular fitness.

**Method:** 40 Individuals who were admitted in IP for bronchial asthma and got discharged were selected randomly based on inclusion and exclusion criteria from Saveetha Medical College And Hospital. The selected participants were allocated into 2 groups. Pole striding group was treated with routine treatment along with pole striding. Calisthenic exercise group was treated with only routine treatment. Treatments were given to the groups according to the treatment protocol after discharge as home care therapy. Six-Minute Walk Test, Pulmonary Function Test were the outcome measures used in this study.

**Result:** The improvement was seen in both groups though statistically pole striding group was more significant than calisthenic exercise group in 6 minute walk test and forced expiratory volume in one second (FEV1) with mean difference of 28.5m, 0.24L, respectively. P- value is <0.0001.

**Conclusion:** Hereby, This study concludes that Pole-striding approach has a better effect in improving in Cardiovascular fitness among Bronchial asthma.

**Keywords:** Physical Activity, pole striding, Six minute walk test, Pulmonary Function Test.

## Introduction

Chronic bronchial asthma is characterised by mucus overproduction, airway hyper-responsiveness, reversible airway blockage, and airway inflammation.<sup>1</sup> Asthma prevalence in the

US is 2.05%, according to Epidemiology of Asthma, Respiratory Symptoms, and Chronic Bronchitis in Adults (INSEARCH). Affecting 17.23 million people. Overall, 34.3 million individuals in India have asthma, which accounts for 13.09% of the global burden.<sup>2</sup>

**Corresponding Author:** Yogeshwaran L, Post Graduate, Saveetha college of physiotherapy, Saveetha Institute Of Medical & Technical Sciences, Chennai, Tamil Nadu, India.

**E-mail:** yogeshw148@gmail.com

3.23 million people died from chronic obstructive pulmonary illness, the third most common cause of dying in the world in 2019. LMIC account for about 90% of casualties from Chronic Obstructive lung illness in those under the age of 70. Tobacco smoking accounts for over 70% of COPD cases in high-income countries. The aetiology of bronchial asthma (BA), a chronic inflammatory illness of the respiratory system, involves inflammatory cells and mediators that are, in part, influenced by hereditary factors. It has airflow blockage and bronchial hyper reactivity, which may be fully or partially reversible. These three processes—bronchial inflammation, allergies, and bronchial hyper-reactivity—have an impact on the pathophysiology of this illness. Inflammatory cells, which can result in oedema and broncho-constriction, are implicated in bronchial inflammation.<sup>3</sup> The effect of car emissions on the timing of chronic lung illness attacks and the incidence of chronic lung illness in universal, however, is difficult to assess. An augmented immediate reaction to hay fever and heightened pneumonitis may be responsible for the rising incidence of allergic rhinitis allergies.<sup>4</sup> At any stage of COPD, lung dynamic hyperinflation can be seen in addition to or independently of static hyperinflation.<sup>5</sup> Nordic walking (pole walking) originated in Scandinavia and was introduced to Central Europe about 20 years back. It immediately became popular among people of various ages. Nordic walking has shown to be a simple and practical type of exercise that can be done by practically anybody, anywhere, and at any time.<sup>6</sup> The modern lifestyle puts people at risk for chronic illness together with diabetes, fatness, high blood pressure, and ischemic heart diseases since it discourages regular physical activity and exercise training. It is a type of walking that incorporates handheld poles and is employed in contrast to lower extremity mobility. It has low-collision, judicious-potency features similar to walking.<sup>7</sup> Expanded foot step length, accelerated pelvis range of travel, and a clutch/release fist clasp method are all key aspects of the Nordic walking method. A additional usual walk, a excessive forelimb posture, and a constant fist grasp are all key aspects of the Exerstriding style.<sup>7</sup> Participants who reported developing asthma throughout the observation period had a greater incidence of FEV1 reduction. Contrary to the results

of two earlier trials, however.<sup>8</sup> So in this study we are going to found out the effectiveness of pole striding in bronchial asthma.

### AIM

The aim of the analysis is to appraise the impact of the pole striding intervention program on bronchial asthma, with regard to the potential improvements in cardiovascular fitness.

### Methods

The Experimental study was conducted on 40 participants with bronchial asthma were selected as samples' from Saveetha Medical College And Hospital, Thandalam according to the inclusion and exclusion criteria. Simple random sampling technique was used in this study. This study was conducted between July 2022 to December 2022.

#### Inclusion criteria:

- Both gender.
- Age - 40 to 55 years.
- Participants with bronchial asthma ( stage I and II ).( COPD Assessment Test)
- Participants having grade I and II Dyspnea (Modified Medical Research Council).
- Participants with stable vitals.

#### Exclusion criteria:

- Participants immobile due to any previous musculoskeletal or neurological conditions.
- Participants having peripheral vascular disease
- Obese individuals were excluded.

#### Outcome Measures:

The initial assessment was conducted at the outset of the study, serving as a baseline measurement before of treatment was administered. Subsequently, the participants underwent the designated treatment for a duration of four weeks. At the end of this four-week treatment phase, post-assessment was performed to evaluate the effects and progress resulting from the administered treatment.

- Six-minute walk test
- Pulmonary function test (FEV1).

**Study Procedure**

The process began by applying inclusion criteria to identify a suitable sample size, resulting in the selection of 40 participants for the study. Prior to the intervention, it was essential to obtain written consent from the patient. Written consent ensures that the patient is fully informed about the procedure, its potential risks and benefits, and any alternative options available. Obtaining written consent helps protect the participant’s rights and ensures a transparent and ethical approach to their medical care. These participants were then divided into two distinct groups. The first group, referred to as the pole striding group, received a combination of conventional therapy and pole striding. On the other hand, the second group, known as the calisthenic exercise group, solely underwent conventional therapy.

Once the participants were assigned to their respective groups, treatment was administered to both groups following the established treatment protocol. This treatment took place after the participants were discharged, and it was implemented as part of the home care therapy they received.

In this study, two outcome measures were utilized: the Six-Minute Walk Test (6MWT) and the Pulmonary Function Test. The Six-Minute Walk Test was employed to evaluate the participants’ aerobic capacity, providing valuable insights into their functional endurance and cardiovascular fitness. This test involved measuring the distance participants could walk within a duration of six minutes, serving as an indicator of their overall physical performance.

On the other hand, the Pulmonary Function Test was employed to assess various lung volumes and capacities, including the Forced Expiratory Volume in one second (FEV1), which is a critical measure of lung function and airway obstruction. By utilizing these comprehensive outcome measures were able to gather a comprehensive understanding of both the participants’ exercise capacity and pulmonary health.

All the collected data were carefully recorded, tabulated, and analysed.

**Treatment protocol**

**Pole striding group**

- Pursed lip breathing exercise - 5 reps of 5 set, thrice a day.
- Diaphragmatic breathing exercise - 5reps of 5 set, thrice a day.
- Huffing and coughing technique - thrice a day.
- Pole striding - 3 to 5 times/ week, 30 minutes/ day for 4 weeks.

**Calisthenic exercise group**

- Pursed lip breathing exercise- 5reps of 5 set, thrice a day.
- Diaphragmatic breathing exercise - 5 reps of 5 set, thrice a day.
- Huffing and coughing technique - thrice a day.
- Calisthenic exercise (wall push- ups, wall-squats) - 3 to 5 times/week, 30 minutes every day for 4 weeks.

**Data Analysis**

**Table 1: Shows 6MWT values in Pole striding and Calisthenic exercise Groups**

6MWT	Pre-test (M)	Post- test (M)	
Study group	Mean±SD	Mean±SD	P- value
Pole striding group	264±13.92	351.50±13.09	p>0.0001
Calisthenic exercise group	262.50±15.52	323±15.93	p>0.0001

**Table 2: Shows Forced expiratory volume in one second (FEV1) values in Pole striding and Calisthenic exercise Groups**

Pulmonary function test	Pre-test (Liters)	Post -test (Liters)	
Study group	Mean±SD	Mean±SD	P-value
Pole striding group	1.790±0.085	2.580±0.185	P>0.0001
Calisthenic exercise group	1.785±0.081	2.340±0.105	P>0.0001

## Result

Total of 40 asthmatic participants were included in this study. All the participants were continued the study as per the allocation. At the end of 4<sup>th</sup> week post test values of 6MWT and Forced expiratory volume in one second (FEV1) were presented in Table1 and 2. The pole striding group Pre-test Mean±SD was 264±13.92meters. Post- test Mean±SD was 351.50±13.09meters. The Calisthenic exercise group Pre-test Mean±SD was 262.50±15.52meters. Post-test Mean±SD was 323±15.93meters. p- value is < 0.0001 hence, statistically significant. The improvement was seen in both groups though statistically pole striding group was more significant than calisthenic exercise group with mean difference of 28.5m in 6 minute walk test.

The pole striding group Pre-test Mean±SD was 1.790±0.085 liters. Post -test Mean±SD was 2.580±0.185 liters. The calisthenic exercise group Pre-test Mean±SD was 1.785±0.081 liters. post-test Mean±SD was 2.340±0.105 liters. Both groups p-value was <0.000 hence, statistically significant. The improvement was seen in both groups though statistically pole striding group was more significant than calisthenic exercise group with mean difference 0.24L of in pulmonary function test.

## Discussion

In this study the individuals with bronchial asthma were included. Bronchial asthma exacerbates according to the climatic changes mainly in the winter seasons the episodes of dyspnea is more common. Individuals with bronchial asthma were treated with pole striding exercises and calisthenic exercises in this study. Bronchial asthma participants need regular exercises to manage the sudden episodes of dyspnea. Hence all the participants were explained about the risks and benefits of the procedure and Before being

included in the study, written informed permission was taken from every participant.

In this study, 40 participants were selected based on predefined inclusion and exclusion criteria, and their scores were subsequently calculated and analyzed.

The study utilized two outcome measures to assess the effects of the intervention. The first outcome measure was the 6-Minute Walk Test (6MWT), which evaluated the functional performance of the participants through sub-maximal exercise. The distance traveled by the participants in a 6-minute period was measured and used as an indicator of aerobic capacity and endurance. Cones and red color cello tape were used to mark a 30-meter stretch pathway for conducting the 6MWT.

The second outcome measure used in the study was the pulmonary function test (PFT), pulmonary function tests, are used to assess how well the lungs work. They control the amount of air that enters and exits the lungs, the amount of air that enters the blood, and how well the lungs work while you exercise. The forced expiratory volume in 1 second (FEV1) is the most air that a person can violently expel in the instant after their maximum inhalation. In this study, PFT is used to evaluate FEV1.

Another study by Katarzyna Skořkowska-Telichowska et al.,(2016) explored the Review of research on pole striding efficacy and safety in therapeutic rehabilitation in individuals of an advanced age. The results concluded that the pole striding training was a feasible, simple, and effective physical training modality in elderly individuals with Chronic obstructive with respiratory illness. Pole striding has proven to good effect on the routine physical performance pattern of Chronic obstructive with respiratory illness participants compared to a

COPD group that received no exercise intervention across the course of short- and long-term observation.<sup>9</sup>

Furthermore, study by María Vilanova-Pereira et al., (2023), examined the effect of pole striding in asthma participants. The results concluded that the due of its affordability and viability, pole striding may represent a new, community-based therapy strategy for people with asthma. Combining pole striding with education and standard medical therapy may increase exercise tolerance and other asthma-related outcomes.<sup>10</sup>

Another study by v srinivasan et al., (2021) examined the purpose of effect of pursed lip breathing with brashtika pranayama vs incentive spirometry in rehabilitating post covid 19 follow up. The results concluded that patients not only have respiratory complaints but also other issues in order to prevent re-hospitalisation.<sup>11</sup>

Another study by Marcus Tschentcher et al.,(2013) examined the purpose of this study is to compare Nordic walking (walking with poles) to brisk walking and jogging and to systematically summarise, analyse, and interpret the health advantages of each. The review encompassed Nordic walking shows favourable benefits on resting heart rate, blood pressure, exercise capability, maximum oxygen consumption, and quality of life in participants with different conditions and can thus be advised to a wide variety of individuals as primordial, subordinate prophylaxis.<sup>12</sup>

In this study, improvement was observed in both groups; however, statistically, the pole striding group showed a more significant improvement compared to the calisthenic exercise group, with a mean difference of 28.5 meters in the 6-minute walk test. Similarly, in the pulmonary function test, the improvement was evident in both groups, but the pole striding group exhibited a more significant improvement with a mean difference of 0.24 liters, and the p-value was <0.0001.

While the current study provided valuable insights into the effects of the pole striding intervention program on cardiovascular fitness among bronchial asthma participants, there are certain limitations to consider. Firstly, the study employed an experimental design, which may limit the ability to establish

causality between the intervention and outcomes. Additionally, The results may not be generalizable to other contexts and demographics because the sample size was very small and the study was carried out at a single institution.

In conclusion, the present study adds to the existing body of literature by demonstrating the potential benefits of pole striding exercise in improving cardio-vascular fitness and pole striding is a useful technique for increasing both aerobic capacity and physical activity. Hereby, This study concludes that Pole-striding approach has a better effect. However, further study using bigger sample sizes and systematic reviews are warranted to validate and generalize these findings across different populations and settings.

## Conclusion

Participants with asthma who began Pole striding had significant improvements in their cardiovascular fitness level. This study shows improvement in the FEV1 levels and functional capacity in asthmatic participants. Pole striding is a useful technique for increasing both aerobic capacity and physical activity. Hereby, this study concludes that Pole-striding approach has a better effect.

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