

# The Impact of Exercise Training on Asthmatics' Quality Of Life and Lung Function; Systematic Review

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## Abstract

**Study aim:** The goal of this study was to better understand, via randomized trials, how physical exercise improves the respiratory and overall health of persons with asthma.

**Method:** The PRISMA statement (8) was followed in the course of this systematic review investigation. We looked through Cochrane Library, PubMed, and Google Scholar, among other electronic resources. Our search was limited to randomized trials published between 2008 and 2014 that included asthmatics who received physical exercise.

**Result and conclusion:** An aerobic exercise program helps persons with moderate-to-severe chronic asthma feel better, improve their quality of life, reduces anxiety and sadness, and alleviates asthma symptoms. Aerobic exercise may be very beneficial for those with chronic asthma in terms of their clinical treatment. Furthermore, those who are more psychologically distressed may benefit particularly from cardiovascular activity. Changes in total and specific IgE in asthmatics may be explained by seasonal fluctuations; exercise appears to exacerbate this impact, though. Exercise under supervision reduces asthma symptoms and Enhances the quality of life for those who suffer from the condition.

**Keywords:** impact, exercise training, asthma, quality of life, lung function

## Introduction

Regular physical activity and involvement in sports are considered to be key components in the overall treatment of asthma, especially in children and adolescents. There is proof, nevertheless, that some asthmatics may steer clear of physical activity and sports out of concern for exacerbating their symptoms, suffering dyspnea, or both. Some people may not enjoy working out for a variety of reasons, such as misperceived symptoms, family values, medical advice, or organizational regulations (1).

Low levels of physical fitness are a direct result of low levels of regular physical activity. Thus a number of studies (2), but not all (3), have revealed people with asthma to have worse cardiorespiratory fitness when compared to their counterparts. Exercise-induced asthma (EIA) is a condition where certain persons with asthma experience bronchoconstriction as a result of exercising. Additionally, studies have demonstrated

that being breathless and inactive can result in peripheral muscular deconditioning, a significant factor reducing one's ability to exercise(4). This is due to the fact that deconditioning may worsen dyspnea because, as Swallow et al.(5)notes, weakened leg muscles are more easily fatigued and need more ventilation to be maintained during activity. This then exacerbates dyspnea, setting off a vicious cycle that ultimately prevents exercise and progressively deconditions the skeletal muscles (6). Research has also demonstrated that individuals with asthma may exercise and increase their level of fitness, and that in certain cases, air flow restrictions have less to do with exercise capacity than fitness deficiencies (7). The purpose of this study was to better understand, via randomized trials, how physical exercise affects the respiratory and overall health of individuals with asthma.

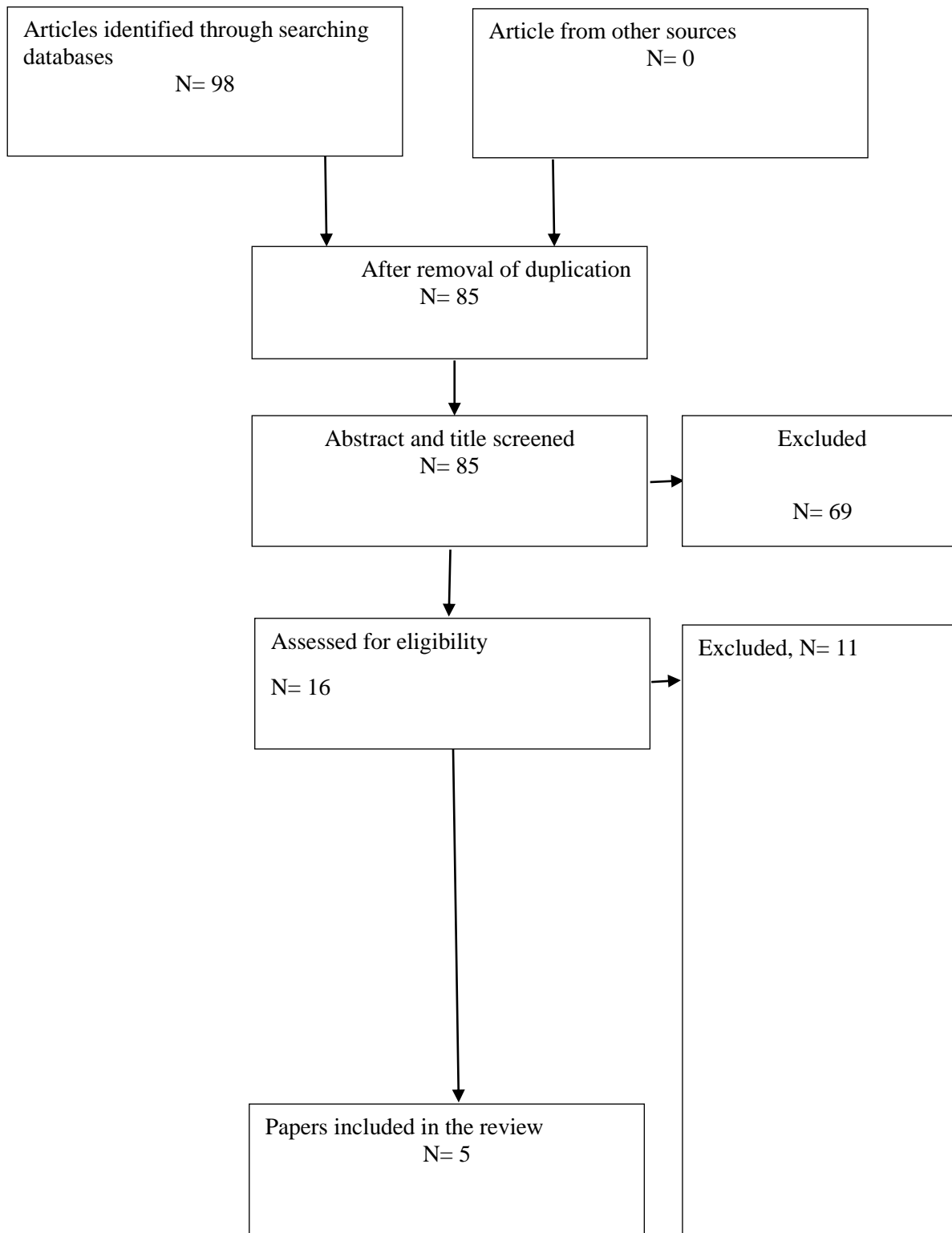
## Method

This systematic review study was conducted according to Preferred reporting items for systematic reviews and meta-analyses (PRISMA) statement(8). We searched electronic databases (PubMed, Google scholar and Cochrane library).Our search focused on randomized studies including asthmatics who underwent physical training published in the period from 2008 to 2014. People with asthma of any age and severity were included in our study. Search terms include (asthma. work capacity, physical, training, rehabilitation, fitness, exercise, aerobic). We took into account asthma diagnoses either by medical diagnosis or by using objective standards. We did not include data from studies of mixed populations when data on individuals with asthma were separately accessible, but we did include data from research reporting outcomes on COPD patients. Outcomes of interest were (Quality of life, episodes of wheeze, exercise endurance and work capacity).

Four authors examined articles for potential relevance using the title, abstract or descriptors, or both. The full text papers from this second comprehensive list were vetted by the same four review writers using criteria related to research design, demographics, treatments, and results. All the papers that were thought to be possibly relevant for inclusion were reviewed by the corresponding author.

A combination of four authors separately extracted data for the trials using a pre developed data extraction form in Google Sheet with access for all authors. In order to get missing data and raw data, two review writers contacted the authors after entering data into a Google Sheet.

**Fig 1: PRISMA consort chart of studies selection**



## Results and discussion

In this study we included 5 randomized controlled trials. The Mendes et al.(9) study demonstrates that an aerobic training program improves asthma-specific quality of life and lowers anxiety and depression levels as well as asthma symptoms in adults with moderate-to-severe persistent asthma. These benefits were linked to baseline values, indicating that patients with worse psychosocial levels at baseline showed more improvement. Asthmatic patients' ongoing fear of being dyspneic from an asthma attack negatively impacts their QoL, disrupts their sleep, and makes it harder for them to go about their everyday lives(10). According to the findings of the Mendes et al. (9) study, only patients who engaged in aerobic training had improvements in their physical limitations, frequency of symptoms, and psychosocial domains.

The symptoms of asthma impede patients' quality of life by causing worry, irritability, and sleep disturbance (11). On the other hand, symptom-free patients have a quality of life that is on par with or better than the general population (12). There is a considerable association between subjective perceptions of asthma severity and quality of life, according to several research (12,13). Mendes et al. (9) discovered a favorable relationship between days without asthma symptoms in the training group and improvements in the psychosocial QoL area. Increasing exercise capacity lessens impairment in daily tasks and enhances social life and QoL(9).

Asthma patients' ability to control their condition and adhere to prescribed medication is negatively impacted by depressed symptoms, according to earlier research (14,15). Aerobic exercise is a valuable tool for helping patients adhere to their medication regimens. Patients with higher psychosocial distress should benefit more from aerobic training, as evidenced by the positive correlation found between the baseline values and the reduction in anxiety and depression levels brought on by exercise training(9). It is important to note that an increase in aerobic capacity may be connected to a decrease in asthma symptoms(9). According to a fairly recent study, women with asthma who engage in regular physical exercise are at a lower risk of experiencing an exacerbation(16). A decrease in minute ventilation during mild-to-moderate everyday activities may account for the reduction in asthma symptoms brought on by aerobic exercise(9).

Patients with good asthma control showed no change in inflammatory or other clinical outcomes from a moderately intense physical training program(17). The findings of Moreira et al. hold true for participants who are allowed to take medicine that effectively reduces the symptoms of exercise-induced asthma(17). Recent pooled data from a Cochrane study (18) did not demonstrate that physical training might enhance lung function or reduce wheezy episodes. Nonetheless, maximal expiratory ventilation and cardiac fitness were enhanced by physical exercise. Children in the Moreira et al. program began their physical exercise at an almost recreational level; thus, larger improvements may have been achieved with a more rigorous and energetic program. Spending more time engaging in moderate-intensity exercise and less time in high-intensity exercise, however, has been demonstrated to be the most effective method of raising activity levels (19). Prolonged intense physical exercise has little effect on total activity, most likely because it reduces compensatory activity outside of training sessions (20).

Different levels of airway inflammation have been caused by regular exercise, depending on the activity and the athlete's medical history (21). Unlike asthmatics, healthy athletes' elevated inflammatory cell counts in their airways are not correlated with symptoms or bronchial reactivity brought on by exercise (22). According to recent observations, children in good health who engage in outdoor recreational activities show a notable rise in extracellular ozone in response to ambient ozone levels, without affecting pulmonary function test results (23). In Moreira et al. program, neither of these effects was seen in the asthmatic participants. Despite the fact that the non-exercising group saw a greater fall in extracellular ozone after the

program, there were no discernible differences between the groups. The fact that corticosteroid were administered to every child in the present may have lessened the benefits of exercise.

After six weeks of supervised exercise, a group of middle-aged and older persons with FAOA showed substantial improvements in both disease-specific and generic measures of QOL, according to a randomized controlled trial by Turner et al. The benefits were much bigger than any changes noticed in a well-matched control group and were visible right away after training and three months later(24). The results of the Turner et al. trial are hard to compare to those of other studies on exercise training in people with asthma since individuals had more severe airway restriction (25,26) and were much older (25). Furthermore, the two studies that have documented improvements in quality of life did not employ a questionnaire designed especially for people with asthma and included interventions besides exercise training, like patient education, breathing retraining, relaxation and leisure techniques, dietary advice, and psychological counseling (25).

**Table 1: main findings and characteristics of included studies**

Citation	Sample size	Study aim	Method	Main findings
WANG et al., 2009 (27)	Intervention, n= 15 Control, n= 15	The effects of a 6-week swimming intervention on asthma severity, and pulmonary function tests were examined in this study.	Randomized controlled trial	After the swimming intervention, the experimental group showed a significant improvement in peak expiratory flow (PEF) compared to the control group. Additionally, the experimental group showed a significant improvement in the severity of asthma compared to the control group. These data suggest that a swimming program for children with asthma can improve some disease parameters. Swimming may be a useful non-pharmacological intervention for the child or adolescent with asthma.
Turner et al., 2011 (24)	Intervention, n= 19 Control, n= 15	To find out if exercise training enhances adults with fixed airway obstruction asthma's (FAOA) functional exercise capacity and quality of life.	Randomized controlled trial	In the symptom and activity limitation domains, the exercise group improved more quickly than the control group did both three months after the intervention and immediately afterward. Following training, 6MWD rose in the exercise group and continued to rise at the 3-month follow-up. Despite there being no change in the control group, the

				<p>difference in 6MWD across the groups was not statistically significant. For individuals with asthma, supervised exercise training reduces symptoms and enhances quality of life.</p>
Moreira et al., 2008	<p>Intervention, n= 17 Control, n= 17</p>	<p>In school-aged children with asthma, the effects of a three-month physical training program on airway inflammation and clinical outcomes were investigated.</p>	<p>Randomized controlled trial</p>	<p>The exercise group engaged in moderate-to-vigorous activity for twice as long as the controls did after the program. Regarding asthma outcomes, there were no variations in changes observed amongst groups. But as didmite-specific IgE, overall IgE fell higher in the exercise group. In children with persistent asthma, training may have decreased both total and allergen-specific immunoglobulin E levels while also not increasing inflammation. It is concluded that children with asthma who have a managed illness have no reason not to exercise.</p>

Mendes et al., 2010 (9)	Intervention, n= 44 Control, n= 45	Study assessed how an aerobic exercise program helped individuals with moderate to severe persistent asthma with their psychological distress and symptoms of asthma and QoL.	Randomized controlled trial	Only the patients in the training group showed a substantial improvement in the QoL categories and overall scores at three months. This group also had a significant improvement in the number of days without asthma symptoms as well as in anxiety and despair. Furthermore, a linear correlation was noted between the number of days without asthma symptoms and the improvement in aerobic capacity. Aerobic exercise may be very beneficial for people with chronic asthma in terms of their clinical care. Furthermore, patients experiencing higher levels of psychosocial distress may find them particularly helpful.
Prem et al., 2013 (28)	Intervention 1, n= 39 Intervention 2, n=36 Control, n= 40	To contrast two breathing techniques for asthmatic patients with a control group.	Randomized controlled trial	All three groups shared similar baseline characteristics. Compared to the pranayama and control groups, the Buteyko groups demonstrated stronger patterns of improvement in the overall Asthma Quality of Life Questionnaire score after the intervention. When the pranayama and control groups were compared, the pranayama group's overall Asthma Quality of Life Questionnaire score significantly improved. In conclusion, compared to the group doing the pranayama breathing practice, the Buteyko group had stronger patterns of improvement in quality of life and asthma management.



## Conclusion

In terms of their clinical care, individuals with persistent asthma may benefit greatly from aerobic exercise. Moreover, aerobic exercise may be especially beneficial for individuals who are experiencing higher levels of psychosocial distress. Seasonal variations in the exposure to mite allergens may account for changes in total and specific IgE in asthmatics sensitive to mites; exercise, however, seems to amplify this effect. Under supervision, fitness training lowers asthma symptoms and improves quality of life for sufferers.

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