

Asthma and Exercise

By Nicolette Clark and Graduate Student Mentor, Jeremy Ducharme

Introduction

Asthma is a chronic condition that affects the airways in the lungs and through bronchial inflammation can narrow these airways at times causing difficulty breathing. Common characteristics of asthma include episodic wheezing, shortness of breath, tightness of the chest, and coughing (1). It is estimated that worldwide, more than 300 million people are suffering from asthma and the financial burden can be up to \$1300 per patient every year (2). The upper end of the financial burden is mostly seen in western, more developed countries where there is access to treatment and medication (2). Asthma is most dangerous in undeveloped countries where there is poor access to medical care and asthma often goes uncontrolled, together these increase the risk for asthma related fatalities (2). Several factors can trigger asthmatic symptoms, including smoke, dust, animal fur, food products, environmental pollution, and exercise (1). There is also a correlation between the time of day and the severity of asthma symptoms (2). Nocturnal worsening of asthma symptoms is said to occur in about two-thirds of people with asthma, but the exact cause is unknown (2). The prevalence of nocturnal worsening of symptoms is seen in both children and adults, but there need to be more studies specifically analyzing the effects on children (2).

Asthma is the most common chronic disease in children (3). It can impede normal development and growth during the critical period of adolescence (1). Asthma can be especially isolating for children in group settings such as sports or other outdoor activities, further interfering with their social development (1). The accumulation of asthmatic symptoms decreases both motivation and level of physical activity (4). Thus, demonstrating that the effects of asthma on children are far more than just physiological, the emotional and mental distress may be just as profound.

Although there is no cure for asthma, there are various treatment options to control symptoms. Common treatments include bronchodilators, steroid inhalers, and anti-inflammatory (2). Therefore, asthma comes with a financial burden and traditional treatment options may not always be affordable. Exercise has been shown to be another effective option to control symptoms of asthma (5). There is a misconception that individuals with asthma should avoid exercise because it triggers symptoms, but there is literature supporting exercise as an

effective treatment for asthma (4). For example, 5 systematic reviews assessing the relationship between asthma and exercise showed that asthmatic patients can have significant improvements in maximal oxygen consumption and endurance performance (5). This finding contradicts a commonly held belief that exercise exacerbates asthmatic symptoms. The fear among individuals with asthma is that exercise will worsen their symptoms, so they avoid exercise they deem strenuous. Importantly, it is this inactivity that ends up having negative long-term effects and increases the risk of noncommunicable diseases such as diabetes, obesity, and heart disease. Exercise is a cost-effective way to treat symptoms of asthma and goes against common misconceptions associated with exercise and asthma. Research on the effects of physical activity and exercise gives patients different types of treatment options unique to their situation. The positive effects of exercise are more than just physiological, it can also help treat mental and emotional disturbances such as depression and social anxiety (5). This article will examine the effectiveness of different types of exercise for reducing symptoms of asthma and the importance of proper exercise prescription with those that have asthma, therefore, demonstrating that exercise can help control symptoms of asthma by reducing inflammation, increasing aerobic capacity, and improving lung function.

Misconceptions with Asthma

There are several misconceptions associated with asthma and participating in physical activity. Despite its known benefits, participation in exercise is significantly lower in individuals with asthma compared to non-asthmatics (4). This decrease in physical activity can be attributed to the effects of exercise being similar to the symptoms associated with asthma, such as shortness of breath and hyperventilation. In a study done by Winn and colleagues, they reported that fear was frequently cited as a reason why individuals with asthma avoid exercise (4). There is a misconception that exercise will exacerbate their symptoms and that asthma cannot be properly controlled during exercise. These misconceptions can be refuted with proper education and exposure to activities most suitable for asthma. Winn and colleagues interviewed 54 adolescents with asthma about the stigma surrounding asthma and its impact on their lifestyle. Their results showed that although there may be a fear of exercise, 81% of the participants said that they enjoyed exercise that involved a variety of skills, especially team games (4). The researchers concluded that educating adolescents about the benefits of exercise could help reduce stigmas and increase awareness of exercise as a health benefit, instead of a risk (4). Additionally,

symptoms of asthma not only manifest physiological, but can also have psychological consequences. For example, teachers are less likely to encourage physical activities for children with asthma, which as a result can make a child feel isolated from their peers (4). This form of social isolation can leave a child feeling embarrassed and insecure. By encouraging exercise to children with asthma this form of social isolation may be avoided by increasing the opportunities for social interactions which may result in improved mental health.

Asthma Control and Exercise

Heikkinen and associates conducted a population-based cohort study that analyzed the relationship between asthma control and exercise in 162 young adults (6). They theorized that exercise would improve the control of asthma symptoms. Asthma control was measured using a questionnaire that evaluated the prevalence of symptoms related to asthma such as mucus secretion, wheezing, cough, and shortness of breath, use of medication, and level of exercise. Their results showed that wheezing decreased with increased levels of exercise greater than 5 hours per week. The strongest correlation between exercise and asthma control was seen in the high-intensity group (6). They demonstrated that compared to the lower activity groups, the high-intensity group had the best asthma control outcomes. Additionally, the occurrence of coughing and shortness of breath was highest in the low exercise group and the occurrence decreased with increased levels of activity (6). Heikkinen's study also found that exercise can positively influence the airways of smooth muscle, breathing patterns, and maximal oxygen consumption. Inflammation is one of the main clinical manifestations of asthmatic symptoms (6). Regular exercise has been shown to decrease inflammation, which can lead to more efficient immune system responses and decrease the prevalence of infections (6). Although the results from Heikkinen's study showed a positive correlation between exercise and asthma control, less than one-fourth of individuals with asthma regularly engage in physical activity (6). Low levels of physical activity may be attributed to a lack of research on how regular exercise affects asthma and more research and education are needed to broaden the amount of knowledge on this topic (6). There is evidence supporting the claim that exercise can effectively control asthma by reducing inflammation, but the effectiveness of exercise may vary depending on the level of exercise.

Effects of Different Levels of Exercise

Jaakkola and colleagues assessed the effects of different levels of physical activity and asthma control (7). They conducted a large population-based study with 1922 participants aged 17-73 years with bronchial asthma. The authors hypothesized that moderate intensity exercise would improve asthma control, but exercise at high, intense levels could adversely affect asthma. The participants engaged in their normal exercise regimen compared different individuals that exercised at various levels. The primary outcome measured was asthma control using the Northern Finnish Asthma Study (NoFAS) questionnaire and the Asthma Control Test (ACT). Their results showed that there was a positive relationship between the intensity of exercise and improved asthma symptoms. Asthma control scores ranged from 5 to 25 points with 25 being the highest possible score indicating complete asthma control. The best asthma control scores were seen in men who were categorized as participating in medium to high levels of exercise, with lower scores in the lower exercise size group (7). Lower scores were also seen in the very high exercise category supporting the hypothesis that extremely high intensity exercise may be detrimental (7). While the majority of participants in their study saw improvement in their asthma with exercise, participants categorized as having severe asthma saw slight decreases in asthma control scores. These findings suggest that moderate to high-intensity exercise is an adequate form of asthma control treatment for most people, but may not be suitable for individuals with severe asthma that is poorly controlled (7). There are specific types of exercise that may be more suitable for individuals with asthma because of its ability to increase aerobic capacity and lung function.

Aerobic Exercise

Aerobic sports are the most common forms of exercise used to strengthen aerobic capacity because there is a positive association between exercise and lung function (6). Specifically, a systematic review by Hansen and colleagues found that aerobic exercise significantly improves lung function and asthma control, but not airway inflammation (8). Swimming is a popular aerobic sport that has been demonstrated as a successful treatment for asthma because it can be performed at a moderate intensity and is a simple form of exercise (1). Bafirman and colleagues assessed if swimming could decrease the prevalence of asthma symptoms and increase peak expiratory flow in children (1). The participants included 25 experienced swimmers that were elementary aged children and diagnosed with asthma. The main variables measured in their study were peak expiratory flow and occurrence of asthma

symptoms using the ACT. Asthma symptoms that were evaluated were shortness of breath, wheezing, coughing, and insomnia. Measurements were taken pre and post swimming activities. The results from the post-test showed that there was a decrease in asthma symptoms, a decrease in asthma-related complaints, and improvements in peak expiratory flow results. The researchers endorsed swimming as an effective non-pharmacological treatment for asthma. Swimming develops the respiratory muscles, which reduces symptoms of asthma and improves respiration which in turn decreases the risk of asthma attacks (1).

Outdoor Activities

Individuals who suffer from asthma are more likely to avoid outdoor activities and prefer exercising inside (9). This preference for indoor activities may be due to environmental allergens or cold weather as these are common triggers for asthmatic episodes (1). There is a high prevalence of Vitamin D deficiency in the United States and exercising outside can help increase levels of Vitamin D, which can aid in preventing allergic symptoms (9). Prosegger and colleagues conducted a randomized controlled study that analyzed the effects outdoor winter exercises have on airway inflammation (9). The participants consisted of adults aged 18-55 years old who had well controlled asthma. The intervention group participated in a 10-day winter sports program and the control group had no intervention. Their primary outcomes measured were fractional exhaled nitric oxide and the Rhin Asthma Quality of Life Scale. Fractional exhaled nitric oxide is an important component of asthma management because uses breath analysis to measure the level of airway inflammation. Their results showed that there were improved fractional exhaled nitric oxide levels seen in the exercise group, indicating there was a decrease in airway inflammation. The researchers concluded that winter exercise did not produce any adverse effects and effectively reduced airway inflammation. Based on these findings, it is recommended that individuals with well controlled asthma should engage in exercise and should not be limited to only indoor activities because of fear of an inflammatory response (9).

Conclusion

Based on the findings of the current review, exercise is an effective treatment in controlling asthmatic symptoms and refutes common misconceptions associated with asthma. There is evidence that aerobic sports elicit the greatest benefits for improving lung function and aerobic capacity (8). Additionally, we recommend that individuals with well controlled asthma should engage in moderate to high intensity exercise as this corresponds with the best asthma

symptom outcomes such as reduced inflammation, improved aerobic capacity and lung function. Exercise is a valid treatment for asthma and should be incorporated into a management plan for asthma control.

4 Elements

Apply It

- Regularly participating in moderate to high intensity exercise has been shown to produce the best asthma outcomes.
- Aerobic exercises such as swimming are the most effective forms of asthma control because of its simple skill requirements and the intensity can be easily controlled.

Bridging the Gap

A common misconception amongst individuals with asthma is that exercise exasperates their symptoms. Aerobic exercise has been demonstrated to be beneficial for improving lung function and aerobic capacity. Regularly participating in high to moderate intensity exercise results in the best outcomes for individuals with well controlled asthma.

Summary Statement

Asthma is a prevalent condition affecting individuals of all ages and continued education can help debunk the common misconception that exercise worsens asthma. Moderate to high intensity exercise has been shown to effectively improve asthmatic outcomes such as lung function, aerobic capacity, and peak expiratory flow.

Pulled text

“Research on the effects of physical activity and exercise gives patients different types of treatment options unique to their situation. The positive effects of exercise are more than just physiological, it can also help treat mental and emotional disturbances such as depression and social anxiety (5). This article will examine the effectiveness of different types of exercise and the importance of proper exercise prescription with those that have asthma, therefore, demonstrating that exercise can help control symptoms of asthma by reducing inflammation, increasing aerobic capacity, and improving lung function.”

Bio:

Nicolette Clark is currently in her senior year in the Exercise Science program at the University of New Mexico, where she was also a member of the women’s volleyball team. After graduating with her BS in Exercise she will be pursuing a BSN as a nursing student at Creighton University.

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