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Physical Activity and Diet in Asthma Patients: Benefits, Risks, and Practical Recommendations - A Review of a Literature

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ABSTRACT

Introduction. Historically, individuals with asthma were often limited in physical activity due to fear of exercise-induced bronchoconstriction, and diet was largely overlooked in routine care.

Aim. This narrative review summarizes evidence on benefits/risks of physical activity and diet in asthma management, providing practical recommendations for safe exercise and healthy eating.

State of knowledge. Regular physical activity improves cardiorespiratory fitness, exercise tolerance, symptom control, and quality of life in asthma, while reducing inflammation in well-controlled disease. However, exercise can trigger bronchoconstriction, particularly in poorly controlled asthma or with environmental triggers (cold air, allergens, pollution). Dietary patterns significantly influence outcomes: Mediterranean- or plant-rich diets (fruits, vegetables, whole grains, omega-3 foods) improve control and reduce exacerbations, while Western diets (saturated fat, ultra-processed foods) worsen disease severity.

Summary. Individualized exercise programs and plant-based dietary patterns should be integrated into asthma management to enhance functional capacity and symptom control. When asthma is well-controlled and environmental factors considered, physical activity and healthy eating are safe and beneficial. High-quality RCTs are needed to optimize protocols and assess long-term impact of combined lifestyle interventions on asthma control.

Keywords: asthma; physical activity; exercise; nutrition; diet; Mediterranean diet; exercise-induced bronchoconstriction; respiratory health

1. Introduction

Asthma is a common chronic respiratory disease that affects millions of children and adults worldwide. The condition is characterized by chronic airway inflammation, bronchial hyperresponsiveness, and variable airflow limitation. Typical symptoms include wheezing, shortness of breath, chest tightness, and coughing, which may fluctuate in intensity and frequency over time (1-4). Beyond respiratory symptoms, asthma can substantially impair physical performance, daily functioning, and overall quality of life (1,3,5).

For many years, patients with asthma were frequently advised to limit physical exertion, as exercise was recognized as a potential trigger of bronchoconstriction. Exercise-induced bronchoconstriction arises from increased ventilation during physical activity, which leads to airway cooling and drying and can activate inflammatory pathways and cause transient airway narrowing. As a result, many individuals with asthma develop fear of physical activity and tend to adopt a sedentary lifestyle (5,6).

In recent decades, however, the perception of exercise in asthma management has shifted considerably. Growing clinical and experimental evidence indicates that regular physical activity confers meaningful physiological and clinical benefits for individuals with asthma. Structured exercise programs can improve cardiorespiratory fitness, strengthen respiratory muscles, and reduce the perception of symptoms during exertion, and may also favorably influence systemic inflammation, autonomic regulation, and psychological well-being (1,3,7).

At the same time, an expanding body of research has highlighted the role of diet and nutrition in the development and course of asthma (8-10). The rise in asthma prevalence has paralleled the spread of Western-type eating patterns, whereas diets rich in fruits, vegetables, and plant-based foods appear to protect against asthma and improve symptom control, likely through effects on systemic inflammation, oxidative stress, and immune regulation (9). Observational studies suggest that higher adherence to Mediterranean-type or plant-based dietary patterns is associated with better asthma control and reduced exacerbation risk, while excess intake of saturated fat, processed foods, and certain animal products may worsen outcomes (9,11). These findings support the growing interest in lifestyle-based interventions that combine physical activity and diet as non-pharmacologic components of asthma management(9,12).

Despite these advantages, both dietary (13,14) and exercise interventions must be individualized and carefully monitored in patients with asthma. Environmental conditions, exercise intensity, and the level of asthma control influence the risk of exercise-induced bronchoconstriction and symptom exacerbation, while dietary changes may interact with medications, body weight, and socioeconomic factors (5,6,15). Understanding both the potential benefits and risks of diet (13,14) and physical activity is therefore essential for clinicians, physiotherapists, and patients when planning safe and effective lifestyle strategies (5,6,13,14).

The aim of this narrative review is to summarize current evidence regarding the relationship between physical activity and diet in asthma patients, with a particular focus on the potential

benefits, risks, and practical recommendations for safe exercise participation and healthy eating patterns in this population.

2. Methods

This narrative review was conducted to summarize current evidence on the role of both physical activity and diet in asthma patients, including their benefits, risks, and practical implications for management. The literature search was carried out in major electronic databases, including PubMed, Scopus, and Google Scholar. Articles published between January 2015 and February 2026 were considered for inclusion.

The search strategy combined the following keywords and their synonyms: “asthma”, “physical activity”, “exercise training”, “exercise-induced bronchoconstriction”, “aerobic exercise”, “respiratory health”, “diet”, “nutrition”, “obesity”, “weight loss”, and “lifestyle intervention”. Clinical trials, review articles and meta-analysis evaluating the effects of physical activity, dietary patterns, and combined lifestyle interventions on asthma-related outcomes - such as lung function, symptom control, exacerbation risk, exercise capacity, medication use, and quality of life - were screened.

Studies were eligible if they focused on exercise interventions, dietary or weight-loss programs, or combined lifestyle interventions in patients with asthma, or on physiological responses and clinical recommendations regarding physical activity and diet in this population. Articles not available in English, conference abstracts without full text, and publications that did not directly address physical activity, diet, or lifestyle factors in the context of asthma management were excluded.

3. Results

3.1. Current treatment

Asthma is managed through a combination of pharmacologic therapy and environmental control measures. First-line treatment typically includes inhaled corticosteroids for long-term control, often combined with long-acting beta-agonists in patients with persistent symptoms, while short-acting beta-agonists serve as rescue medication during acute episodes (9,16). Additional pharmacologic options may involve oral corticosteroids, leukotriene modifiers, or biologic therapies in selected patients with severe or difficult-to-control disease. Environmental interventions - such as reducing exposure to tobacco smoke, allergens, and indoor pollutants - help decrease asthma exacerbations but do not modify the underlying inflammatory process. These established therapies create the foundation upon which lifestyle-based interventions,

including physical activity and diet, can be integrated to further optimize asthma control and quality of life (9,16,17).

3.2. Physical Activity in Asthma

3.2.1. Benefits of Physical Activity in Asthma

Regular physical activity induces several physiological adaptations that are particularly relevant for individuals with asthma (18). The main benefits, mechanisms, and clinical implications of regular physical activity in asthma are summarized in Table 1.

One of the most consistently reported benefits is improved cardiorespiratory fitness, including increased maximal oxygen uptake and enhanced cardiovascular efficiency, which allow patients to perform physical tasks with lower perceived exertion. Meta-analyses show that structured exercise programs can significantly increase peak VO2 and functional exercise capacity in adults with asthma (1,3,19,20).

Exercise training may also enhance respiratory muscle strength and endurance. Repeated ventilatory loading during aerobic exercise and specific inspiratory muscle training improve the performance of the diaphragm and accessory respiratory muscles, which can reduce exertional dyspnea and the sensation of breathlessness during daily activities (21,22).

It is important to note that different exercise modalities influence spirometric parameters differently in asthma patients. A 2023 meta-analysis of 28 randomized controlled trials (n=2,155) demonstrated that respiratory training, aerobic training, relaxation training, yoga, and combined respiratory-aerobic programs significantly improved FEV_1 levels and reduced PEF variability compared to controls. Aerobic training, respiratory training, yoga, and combined programs also enhanced FVC, while respiratory training, aerobic training, and yoga improved the FEV_1/FVC ratio. Surface under the cumulative ranking curve (SUCRA) analysis indicated relaxation training was most effective for FEV_1, combined respiratory-aerobic training excelled for FVC, and yoga training best reduced PEF variability (23).

In addition to mechanical adaptations, physical activity can modulate inflammatory and immune processes. Moderate-intensity aerobic exercise has been associated with reductions in airway and systemic inflammatory markers, including decreases in eosinophilic inflammation and pro-inflammatory cytokines, and improvements in asthma control scores. These anti-inflammatory and immunomodulatory effects are thought to contribute to better symptom control and fewer exacerbations (1,3,7,24).

Another important benefit of physical activity is its positive impact on psychological well-being and health-related quality of life. Regular exercise has been shown to improve asthma-related quality of life, increase self-confidence, and reduce anxiety and activity-related fear in patients with asthma. Furthermore, physical activity helps maintain a healthy body weight, which is relevant because obesity is frequently associated with greater asthma severity, poorer control, and increased exacerbation risk (3,16,21-23).

Benefit	**Mechanism**	**Clinical Impact**
Improved cardiorespiratory fitness	Increased VO_2max and cardiovascular efficiency	Greater exercise tolerance
Enhanced respiratory muscle strength	Repeated ventilatory stimulation	Reduced dyspnea
Reduced systemic inflammation	Anti-inflammatory effects of regular exercise	Better symptom control
Improved quality of life	Increased physical capacity and self-confidence	Reduced disease burden
Better weight control	Increased energy expenditure	Lower risk of obesity-related asthma worsening

Table 1. Potential benefits of regular physical activity in patients with asthma

3.2.2. Risks Associated with Physical Activity in Asthma

Although physical activity offers many benefits, certain risks need to be considered in individuals with asthma(27,28). The main risks and preventive strategies related to physical activity in asthma are summarized in Table 2.

The most common concern is exercise-induced bronchoconstriction, which typically occurs during or within 5-15 minutes after exercise and may cause coughing, wheezing, chest tightness, and shortness of breath. If not recognized and managed appropriately, these symptoms can discourage patients from engaging in regular physical activity (27,28).

Environmental factors such as cold or dry air, air pollution, and exposure to allergens can further increase the likelihood and severity of bronchoconstriction during exercise. Outdoor physical activity in unfavorable environmental conditions, or in settings with high levels of chlorine or irritant fumes, may therefore trigger symptoms in susceptible individuals (29,30).

Another potential risk is excessive exercise intensity, particularly in patients with poorly controlled or unstable asthma. High ventilatory demand may aggravate symptoms, lead to premature exercise termination, and increase the risk of exacerbations, underscoring the need for individualized, gradually progressed exercise programs that are aligned with current control status and medication use (28,31).

Risk Factor	**Description**	**Prevention**
Exercise-induced bronchoconstriction (EIB)	Temporary airway narrowing after exercise	Proper warm-up and medication
Cold and dry air	Airway cooling and drying	Indoor exercise or mask use
Air pollution	Irritation of airways	Avoid exercise during high pollution
High-intensity exercise	Increased ventilatory demand	Gradual progression of intensity
Poorly controlled asthma	Increased symptom risk	Optimize pharmacological treatment

Table 2. Potential risks of physical activity in individuals with asthma

3.2.3. Exercise Recommendations for Patients with Asthma

Appropriately prescribed exercise is generally safe for individuals with well-controlled asthma, and patients should be encouraged to engage in regular physical activity as part of routine asthma management (5,31). General exercise recommendations for individuals with asthma are summarized in Table 3.

Aerobic activities such as walking, cycling, swimming, and jogging are commonly recommended, with swimming often considered particularly suitable because warm and humid air may reduce airway irritation and the risk of exercise-induced symptoms (31,32).

Most guidelines suggest that adults with asthma perform moderate-intensity exercise on three to five days per week for approximately 30-60 minutes per session, tailored to individual fitness and disease control (5,31). A structured warm-up period of around 10-15 minutes may help lessen the likelihood of exercise-induced bronchoconstriction, and pre-exercise use of prescribed bronchodilator medication can be considered in patients with a history of exercise-related symptoms(32).

Patients should be educated to monitor their symptoms, recognize warning signs of poor control, and adjust exercise intensity according to their individual tolerance and action plan (5). Collaboration between healthcare professionals and exercise or rehabilitation specialists can

facilitate the development of safe, individualized training programs that integrate pharmacological management, trigger avoidance, and gradual progression of workload (5,31).

Parameter	Recommendation
Frequency	3-5 sessions per week
Duration	30-60 minutes per session
Intensity	Moderate intensity (50-75% HRmax)
Type of activity	Walking, cycling, swimming, jogging
Warm-up	10-15 minutes gradual warm-up
Monitoring	Observe symptoms and use inhaler if necessary

Table 3. General exercise recommendations for individuals with asthma

3.3. Diet and nutrition in asthma

3.3.1. Western, Mediterranean, and plant-based dietary patterns

Observational studies suggest that broader dietary patterns influence asthma risk and control. Western-type diets, characterized by high intake of saturated and trans fats, processed meats, refined grains, and low fruit and vegetable consumption, have been associated with increased asthma risk, worse symptom control, and higher rates of exacerbations. In contrast, Mediterranean-type diets-rich in fruits, vegetables, legumes, whole grains, nuts, olive oil, and fish, and low in red and processed meats-have been linked to lower asthma prevalence and improved asthma control, potentially through anti-inflammatory and antioxidant effects. Plant-based or predominantly vegetarian and vegan patterns emphasizing fruits, vegetables, whole grains, and legumes while limiting animal products may further reduce systemic inflammation and modify asthma outcomes, although evidence from controlled trials remains limited (9,33,34).

3.3.2. Key nutrients and dietary components

Antioxidants

Vitamin C

Vitamin C is a water-soluble antioxidant found abundantly in fruits and vegetables. It scavenges free radicals, regenerates oxidized vitamin E, and supports airway surface hydration, which may help reduce bronchoconstriction and improve lung function (9). Epidemiological studies associate higher vitamin C intake with lower asthma risk and reduced wheeze, particularly in

children (35), whereas short-term supplementation trials have shown inconsistent effects on established asthma(9,14,36).

Vitamin E

Vitamin E, especially α-tocopherol, protects cell membranes from oxidative damage and exerts additional immune-modulating effects(9)on IgE, eicosanoids, and inflammatory cells (33). Dietary sources such as olive oil, nuts, and plant oils are key components of Mediterranean-type diets (37,38). Observational data suggest a protective role of adequate vitamin E (especially α-tocopherol) intake against asthma and atopy, though intervention trials yield mixed results, highlighting the likely importance of long-term dietary patterns rather than isolated supplementation(9,33,38).

Carotenoids

Carotenoids (including β-carotene, β-cryptoxanthin, lutein/zeaxanthin, and lycopene) are lipophilic antioxidants abundant in dark-green leafy vegetables (9), orange fruits (9,33) and tomatoes (33). They quench reactive oxygen species in the airways and have been associated with better lung function and lower asthma risk (33), particularly when consumed as part of a consistently high-fruit-and-vegetable diet. However, some studies report no clear protective effect, so the overall evidence remains suggestive rather than definitive(9,33).

Flavonoids and selenium

Flavonoids-polyphenolic compounds in fruits, vegetables (9) nuts, seeds and wine (33)-act as antioxidants, metal chelators, and anti-inflammatory agents, and may contribute to the protective effect of plant-rich diets on asthma (9,33). Selenium is a cofactor for glutathione peroxidase, and lower plasma and blood selenium levels have been reported in asthma patients, suggesting that adequate selenium intake may support antioxidant defenses (33). Observational and case-control data link these nutrients to reduced asthma risk, but firm conclusions for clinical supplementation are lacking (9,33).

Vitamin D

Vitamin D acts primarily as an immunomodulator, influencing airway smooth-muscle biology and T-helper cell balance rather than functioning as a classic antioxidant (33). Observational studies show that vitamin D deficiency or insufficiency is associated with higher asthma prevalence, poorer control, and increased exacerbations, with some evidence of a dose-response

relationship between serum 25-hydroxyvitamin D and FEV_1/FVC (9). Intervention trials and meta-analyses indicate that vitamin D supplementation may reduce asthma exacerbations, especially in children, but often fails to consistently improve asthma control scores or lung function in broader populations(33,39). Overall, maintaining adequate vitamin D status is likely beneficial, but the role of routine high-dose supplementation in asthma management remains uncertain (9,33,39).

Dairy

Dairy products have been inconsistently linked to asthma risk and control, with some studies suggesting a negative association and others showing neutral (9) or even protective effects (40).

Case-control evidence in children indicates that higher overall dairy intake, especially certain types of cheese, is associated with increased odds of asthma and bronchial hyperreactivity, possibly linked to pro-inflammatory mediators such as IL-17F. Controlled challenge studies show that cow's milk can trigger symptoms and small, statistically significant reductions in FEV_1 and FEV_1/FVC in some adults with mild asthma, though the clinical relevance of these changes remains limited. Elimination of both milk and eggs in a small pediatric trial improved peak expiratory flow by around 22%, supporting the idea that dairy-sensitive subgroups may exist, but larger, long-term studies are needed(9).

In contrast, a large Iranian cross-sectional study in children and adolescents found no association between milk or total dairy intake and wheezing or doctor-confirmed asthma, and even reported that higher consumption of other dairy products such as cheese and yogurt was linked to lower odds of wheezing in the past 12 months (40).

These divergent findings suggest that overall dairy intake alone may not be a uniform risk factor, and that the type of dairy product, underlying allergy, and overall dietary pattern matter (9,40).

Mechanistically, both milk proteins and lipids may modulate airway inflammation and immune responses, but the net effect likely depends on the individual's phenotype and diet context(9).

From a practical perspective, patients with asthma should not be advised to eliminate dairy routinely, but those with suspected dairy-triggered symptoms may benefit from a short-term elimination trial under medical guidance (9,40).

Fiber, fat and dietary patterns

Dietary fiber, especially from whole grains, fruits, and vegetables, is associated with reduced airway inflammation and improved lung function in asthma, likely through fermentation by gut bacteria into short-chain fatty acids (SCFAs) that exert systemic anti-inflammatory and immunomodulatory effects (9,14,33,41). Higher total fiber intake has been linked to better FEV_1, FVC, and asthma control, and soluble fiber supplementation in adults with asthma improves lung function, asthma control, and airway inflammation (9,14,41). Western-type, high-fat, low-fiber diets are associated with a higher risk of obesity and poorer asthma symptom control, highlighting the importance of adequate fiber for both metabolic and respiratory health (9,41). Saturated fat intake, particularly from animal products and processed foods, promotes oxidative stress, increases airway neutrophilic inflammation, and may reduce bronchodilator responsiveness, with even a single high-fat meal impairing lung function and increasing inflammatory markers (9,14,41). Mechanistically, saturated fatty acids activate Toll-like receptor-4 and pro-inflammatory pathways, whereas reducing saturated fat intake correlates with lower neutrophilic airway inflammation in asthma patients (14,41). In contrast, unsaturated fats, including omega-3 polyunsaturated fatty acids (n-3 PUFAs) from fatty fish, have anti-inflammatory properties and may compete with pro-inflammatory omega-6 PUFAs, though clinical trials in asthma show inconsistent effects on lung function and medication use(9,14). Diets rich in fruits and vegetables, whole grains, and n-3 PUFAs-typical of Mediterranean-type and plant-based patterns-have been associated with fewer asthma symptoms and better control, likely through combined effects on systemic inflammation, gut microbiota, and metabolic health(9,14,33,41). High-fat meals and Western-style dietary patterns can also alter the gut microbiome and worsen inflammatory responses relevant to asthma, reinforcing the role of overall dietary quality rather than single nutrients (9,41). For patients with asthma, especially those with obesity, practical recommendations include increasing fiber-rich plant foods, limiting saturated and trans fats, and regularly consuming fish or other sources of n-3 PUFAs (9,14,41). These dietary strategies may enhance response to asthma medications, reduce exacerbations, and support long-term airway health when combined with regular physical activity (9,14,41).

3.3.3. Bodyweight vs asthma

Obesity is both a major risk factor and a disease modifier for asthma in children and adults, increasing the likelihood of asthma onset, exacerbations, and more severe disease (42).

Overweight and obese individuals have higher asthma prevalence than lean counterparts, with a dose-response relationship between body mass index and incident asthma documented in large prospective and meta-analytic studies (41,42). In both pediatric and adult populations, higher body weight is associated with worse asthma control, more frequent exacerbations, and increased use of emergency care or hospital services(9,41,42). Obesity-related metabolic dysfunction and excess adipose tissue are linked to systemic and airway inflammation, including elevated levels of interleukin-6, tumor necrosis factor-α, and leukotrienes, which may worsen airway hyperresponsiveness and symptoms(9,42,43). Mechanistically, obesity alters lung mechanics by reducing functional residual capacity and end-expiratory lung volume, increasing airway collapsibility and promoting airway hyperreactivity, particularly in later-onset adult asthma (38-40). Obese asthmatic patients often respond less well to standard controller therapies, such as inhaled corticosteroids, likely due to steroid resistance driven by adipokine- and cytokine-mediated pathways (9,42,43). Obesity also promotes several comorbidities-such as gastroesophageal reflux and obstructive sleep apnea-which further impair asthma control and quality of life (9,41). Within the obese-asthma syndrome, distinct phenotypes emerge, including early-onset allergic asthma complicated by obesity and later-onset nonallergic asthma where obesity itself plays a central role. For many patients with asthma, weight reduction through diet, physical activity, or structured lifestyle-intervention programs has been associated with improved asthma control, reduced exacerbation risk, and better lung function (38-40). Overall, body weight and adiposity are key determinants of asthma severity and treatment response, highlighting the importance of integrating weight management into comprehensive asthma-care strategies(9,38-40).

3.3.4. Practical dietary considerations for patients with asthma

Patients with asthma should be encouraged to follow a generally plant-rich dietary pattern that emphasizes daily intake of fruits, vegetables, whole grains, legumes, nuts, and seeds, as these foods provide fiber, antioxidants, and anti-inflammatory nutrients linked to better lung function and asthma control. Regular consumption of Mediterranean- or plant-based style meals (e.g., vegetables, olive oil, whole grains, pulses, and fish instead of processed meats) appears beneficial for symptoms, exacerbation risk, and overall cardiometabolic health (9,44).

Patients should limit foods high in saturated fat and industrial trans fats, such as processed meats, fast food, fried snacks, and high-fat dairy, because these patterns are associated with increased airway inflammation, reduced bronchodilator responsiveness, and higher asthma

morbidity. Including sources of omega-3 fatty acids, particularly from fish like salmon, sardines, or mackerel (rather than relying only on supplements), may help counterbalance pro-inflammatory omega-6 intake and support respiratory health, although trial results are mixed and should be presented as adjunctive rather than primary therapy(9).

For many patients, especially those with overweight or obesity, gradual weight management through diet plus physical activity should be highlighted as a key goal, as even modest weight loss can improve asthma control, symptoms, and quality of life (9,41,42). Clinicians should individualize advice about dairy and other potential trigger foods: routine elimination is not recommended, but in patients who report symptom worsening after specific foods (e.g., cow's milk), a short, supervised trial of reduction or substitution (e.g., yogurt, plant milks) may be reasonable while ensuring nutritional adequacy (9,40)

4. Discussion

The findings summarized in this review highlight the complex relationship between physical activity and asthma. Although exercise has traditionally been regarded as a potential trigger for bronchoconstriction, contemporary evidence supports regular physical activity as an important and generally safe component of asthma management when appropriate precautions are taken (1,3).

Multiple studies show that structured exercise programs improve cardiorespiratory fitness and exercise tolerance in patients with asthma, leading to increased maximal oxygen uptake, better ventilatory efficiency, and reduced perception of dyspnea during physical activity (7,45). These adaptations are particularly relevant for individuals who have adopted a sedentary lifestyle due to fear of symptom exacerbation and may help break the cycle of inactivity and deconditioning (3).

Beyond functional benefits, physical activity appears to influence inflammatory and immunological pathways associated with asthma. Moderate-intensity exercise has been associated with reductions in systemic inflammatory markers and improved immune regulation, suggesting that exercise may contribute to improved asthma control through both physiological and anti-inflammatory mechanisms (7). However, the precise mechanisms remain incompletely understood, and heterogeneity in study designs limits firm conclusions about the optimal type, intensity, and duration of exercise (1).

At the same time, exercise-induced bronchoconstriction remains an important clinical concern. The risk of bronchospasm is higher in patients with poorly controlled asthma, during high-intensity or unaccustomed exercise, and when physical activity is performed in cold, dry, or

polluted environments. These observations underscore the importance of individualized exercise prescription, careful monitoring of asthma control, and appropriate pharmacological strategies, such as pre-exercise bronchodilator use when indicated(31,46).

From the dietary perspective, current evidence also points to a significant role for nutrition in asthma outcomes(9,14,41). A consistent pattern from observational and interventional studies: emerges: higher adherence to Mediterranean- or plant-rich dietary patterns, with abundant fruits, vegetables, whole grains, and omega-3-rich foods, is associated with better asthma control, lower airway inflammation, and reduced risk of exacerbations, whereas Western-type diets high in saturated fat and ultra-processed foods are linked to more severe disease (9,14,33,41). In particular, dietary fiber and antioxidants from plant foods appear to modulate systemic and airway inflammation via the gut-lung axis and short-chain fatty acids, while obesity-related dietary patterns worsen lung mechanics, inflammatory burden, and treatment response (9,14,41).

Several studies suggest that regular physical training may reduce medication requirements in patients with asthma without compromising disease control(1). A randomized controlled trial showed that 6 months of regular interval training led to a significant and persistent reduction in inhaled corticosteroid dose (up to 24% compared with baseline) in previously sedentary adults with asthma (47). In another randomized trial, both aerobic training and breathing exercises reduced the number of days requiring rescue medication, with a greater proportion of patients in the aerobic group reporting fewer rescue-medication days than in the breathing-exercise group (48). These findings indicate that structured physical activity can contribute to lower pharmacologic burden in asthma management, although the role of dietary patterns in modulating medication needs requires further investigation (9,41).

From a clinical perspective, healthcare professionals should actively encourage patients with asthma to engage in regular physical activity, while providing tailored guidance on exercise intensity, environmental conditions, and symptom monitoring (3). In parallel, clinicians should integrate dietary counseling into routine asthma care (9,41), recommending individualized, healthy-eating patterns adapted to body weight, comorbidities, and socioeconomic context rather than rigid or universal “asthma-specific” elimination diets (9,14,40). Current evidence suggests that lifestyle interventions in asthma should be multidimensional, integrating dietary guidance, physical activity, and behaviour-change support, ideally coordinated within the broader asthma-care framework, although further large-scale, high-quality trials are needed to

define optimal protocols and to support their implementation in routine clinical practice (13,14,41).

5. Conclusions

Physical activity represents an important non-pharmacological strategy in asthma management, providing multiple physiological and psychological benefits. Regular exercise can improve cardiorespiratory fitness, enhance respiratory muscle function, and contribute to better health-related quality of life in individuals with asthma. Although exercise-induced bronchoconstriction may occur in some patients, the overall body of evidence indicates that appropriately prescribed and supervised physical activity is safe and beneficial when asthma is well controlled. Individualized exercise programs that consider disease control, comorbidities, environmental triggers, and patient preferences should therefore be integrated into comprehensive asthma management.

From the dietary perspective, diets rich in fruits, vegetables, whole grains, and omega-3-containing foods - such as Mediterranean-style or plant-emphasized patterns - are associated with better asthma control, lower airway inflammation, and fewer exacerbations, while Western-type diets high in saturated fat and ultra-processed products tend to be linked to more severe disease. Dietary fiber and antioxidant-rich plant foods appear to attenuate systemic and airway inflammation through mechanisms involving the gut-lung axis and short-chain fatty acids, whereas obesity-promoting dietary patterns may impair lung mechanics, increase inflammatory burden, and reduce treatment responsiveness. Overall, the long-term quality of the whole diet matters more than isolated supplements or single nutrients.

Incorporating structured physical activity into asthma care pathways may lead to meaningful improvements in functional capacity, symptom perception, and overall health outcomes. Integrating individualized dietary counseling alongside safe, sustained participation in physical activity should be considered a key objective of modern, holistic asthma care. Nevertheless, high-quality randomized controlled trials are needed to define optimal exercise and dietary protocols, clarify underlying mechanisms, and explore the long-term impact of combined lifestyle-based interventions on asthma control and disease burden.

6. Limitations

Despite growing evidence supporting the benefits of physical activity and diet in asthma, several limitations persist in the literature. Many studies feature small sample sizes, heterogeneous populations, and variable exercise and dietary protocols, limiting generalizability and comparisons between trials. Most interventions focus primarily on aerobic training, with fewer studies evaluating isolated resistance training or combined aerobic-resistance programs; emerging evidence suggests that resistance training may improve fitness and clinical control, but data remain limited and its safety profile requires further investigation. Inspiratory muscle training also shows promise but needs more robust study. In parallel, many nutrition-related trials are observational or short-term, and high-quality randomized controlled trials on structured dietary patterns in asthma are still scarce.

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References

1. de Lima FF, Pinheiro DHA, Carvalho CRF de. Physical training in adults with asthma: An integrative approach on strategies, mechanisms, and benefits. *Frontiers in Rehabilitation Sciences*. 2023;4:1115352. doi:10.3389/FRESC.2023.1115352 https://doi.org/10.3389/fresc.2023.1115352
2. Serly V, Basyar M, Herman D, Andalas U, Barat S, Pulmonologi dan Kedokteran Respirasi RSUP Djamil DM. Exercise-Induced Asthma: Challenges of Exercise and Management. *Eduvest - Journal of Universal Studies*. 2025;5(3):3091-3108. doi:10.59188/EDUVEST.V5I3.43688 https://doi.org/10.59188/eduvest.v5i3.43688
3. Kuder MM, Clark M, Cooley C, et al. A Systematic Review of the Effect of Physical Activity on Asthma Outcomes. *Journal of Allergy and Clinical Immunology: In Practice*. 2021;9(9):3407-3421.e8. doi: 10.1016/j.jaip.2021.04.048 https://doi.org/10.1016/j.jaip.2021.04.048
4. Pawluk IC, Pawluk EP, Szymaszek AD. Techniques for administering inhaled medicines to patients with bronchial asthma in nursing practice. *Pedagogy and Psychology of Sport*.

2021;7(2):39-50. doi:10.12775/PPS.2021.07.02.003 https://doi.org/10.12775/PPS.2021.07.02.003

5. Panagiotou M, Koulouris NG, Rovina N. Physical Activity: A Missing Link in Asthma Care. *Journal of Clinical Medicine 2020, Vol 9, Page 706*. 2020;9(3):706. doi:10.3390/JCM9030706 https://doi.org/10.3390/jcm9030706
6. Giacco SR Del, Firinu D, Bjermer L, Carlsen KH. Exercise and asthma: an overview. *Eur Clin Respir J*. 2015;2(1):27984. doi:10.3402/ECRJ.V2.27984 https://doi.org/10.3402/ecrj.v2.27984
7. Zhu Q, Zhu J, Wang X, Xu Q. A Meta Analysis of Physical Exercise on Improving Lung Function and Quality of Life Among Asthma Patients. *J Asthma Allergy*. 2022;15:939-955. doi:10.2147/JAA.S369811 https://doi.org/10.2147/JAA.S369811
8. Zhang P. The Role of Diet and Nutrition in Allergic Diseases. *Nutrients*. 2023;15(17). doi:10.3390/NU15173683 https://doi.org/10.3390/nu15173683
9. Alwarith J, Kahleova H, Crosby L, et al. The role of nutrition in asthma prevention and treatment. *Nutr Rev*. 2020;78(11):928-938. doi:10.1093/NUTRIT/NUAA005 https://doi.org/10.1093/nutrit/nuaa005
10. Kozicz MA, Kołodziej M, Saiuk N, et al. The Role of dietary supplements in the treatment of asthma - a narrative review. *Journal of Education, Health and Sport*. 2024;67:50812. doi:10.12775/JEHS.2024.67.50812 https://doi.org/10.12775/JEHS.2024.67.50812
11. Wood LG. Diet, Obesity, and Asthma. *Ann Am Thorac Soc*. 2017;14(Supplement_5):S332-S338. doi:10.1513/ANNALSATS.201702-124AW https://doi.org/10.1513/AnnalsATS.201702-124AW
12. Born CDC, Bhadra R, D'Souza G, et al. Combined Lifestyle Interventions in the Prevention and Management of Asthma and COPD: A Systematic Review. *Nutrients*. 2024;16(10):1515. doi:10.3390/NU16101515/S1 https://doi.org/10.3390/nu16101515
13. Nyenhuis SM, Dixon AE, Ma J. Impact of Lifestyle Interventions Targeting Healthy Diet, Physical Activity, and Weight Loss on Asthma in Adults: What Is the Evidence? *J Allergy Clin Immunol Pract*. 2018;6(3):751-763. doi:10.1016/J.JAIP.2017.10.026 https://doi.org/10.1016/j.jaip.2017.10.026
14. Stoodley I, Williams L, Thompson C, Scott H, Wood L. Evidence for lifestyle interventions in asthma. *Breathe*. 2019;15(2):e50-e61. doi:10.1183/20734735.0019-2019 https://doi.org/10.1183/20734735.0019-2019
15. Dogra S, Patlan I, O'Neill C, Lewthwaite H. Recommendations for 24-Hour Movement Behaviours in Adults with Asthma: A Review of Current Guidelines. *International*

Journal of Environmental Research and Public Health 2020, Vol 17, Page 1789. 2020;17(5):1789. doi:10.3390/IJERPH17051789 https://doi.org/10.3390/ijerph17051789

16. Bridgeman MB, Wilken LA. Essential Role of Pharmacists in Asthma Care and Management. *J Pharm Pract*. 2021;34(1):149-162. doi:10.1177/0897190020927274 https://doi.org/10.1177/0897190020927274
17. Dubin S, Patak P, Jung D. Update on Asthma Management Guidelines. *Mo Med*. 2024;121(5):364. Accessed March 19, 2026. https://pmc.ncbi.nlm.nih.gov/articles/PMC11482852/
18. Matuszek A, Siedy-Florek E, Stawowy Z, et al. The Physical activity as an element of non-pharmacological asthma therapy. *Quality in Sport*. 2025;43:62352. doi:10.12775/QS.2025.43.62352 https://doi.org/10.12775/QS.2025.43.62352
19. Huang F, Yang S, Ma M, Zhang J, Liu H. Effects of Physical Exercises in Asthma: An Umbrella Review of Systematic Review and Meta-Analysis. *Clin Respir J*. 2025;19(4):e70075. doi:10.1111/CRJ.70075 https://doi.org/10.1111/crj.70075
20. Hansen ESH, Pitzner-Fabricius A, Toennesen LL, et al. Effect of aerobic exercise training on asthma in adults: a systematic review and meta-analysis. *European Respiratory Journal*. 2020;56(1). doi:10.1183/13993003.00146-2020 https://doi.org/10.1183/13993003.00146-2020
21. Lista-Paz A, Bouza Cousillas L, Jácome C, et al. Effect of respiratory muscle training in asthma: A systematic review and meta-analysis. *Ann Phys Rehabil Med*. 2023;66(3):101691. doi:10.1016/J.REHAB.2022.101691 https://doi.org/10.1016/j.rehab.2022.101691
22. Sogard AS, Mickleborough TD. The therapeutic role of inspiratory muscle training in the management of asthma: a narrative review. *Am J Physiol Regul Integr Comp Physiol*. 2023;325(5):R645-R663. doi:10.1152/AJPREGU.00325.2022 https://doi.org/10.1152/ajpregu.00325.2022
23. Xing S, Feng S, Zeng D. Effect of exercise intervention on lung function in asthmatic adults: a network meta-analysis. *Ann Med*. 2023;55(2). doi:10.1080/07853890.2023.2237031 https://doi.org/10.1080/07853890.2023.2237031
24. Jaakkola JJK, Aalto SAM, Hernberg S, Kiihamäki SP, Jaakkola MS. Regular exercise improves asthma control in adults: A randomized controlled trial. *Scientific Reports 2019 9:1*. 2019;9(1):12088-. doi:10.1038/s41598-019-48484-8 https://doi.org/10.1038/s41598-019-48484-8

25. Marko M, Pawliczak R. Obesity and asthma: risk, control and treatment. *Advances in Dermatology and Allergology/Postępy Dermatologii i Alergologii*. 2018;35(6):563-571. doi:10.5114/ADA.2018.77607 https://doi.org/10.5114/ada.2018.77607
26. Belhassen M, Marchal C, Deygas F, Jacoud F, Van Ganse E. In patients with asthma, obesity status is associated with poor control and high exacerbation rates, which are reversed after bariatric surgery. *Respir Med*. 2025;236. doi:10.1016/j.rmed.2024.107917 https://doi.org/10.1016/j.rmed.2024.107917
27. Goldin J, Bruner PJ. Exercise-Induced Bronchoconstriction. *StatPearls*. Published online June 2, 2025. Accessed March 19, 2026. https://www.ncbi.nlm.nih.gov/books/NBK557554/
28. Price OJ, Simpson AJ. Exercise and asthma – trigger or treatment? *Respir Med*. 2023;213:107247. doi:10.1016/j.rmed.2023.107247 https://doi.org/10.1016/j.rmed.2023.107247
29. Caggiano S, Cutrera R, Di Marco A, Turchetta A. Exercise-induced bronchospasm and allergy. *Front Pediatr*. 2017;5:247329. doi:10.3389/FPED.2017.00131 https://doi.org/10.3389/fped.2017.00131
30. Van Meerbeke SW, McCarty M, Petrov AA, Schonffeldt-Guerrero P. The Impact of Climate, Aeroallergens, Pollution, and Altitude on Exercise-Induced Bronchoconstriction. *Immunol Allergy Clin North Am*. 2025;45(1):77-88. doi:10.1016/J.IAC.2024.09.004 https://doi.org/10.1016/j.iac.2024.09.004
31. Price OJ, Papadopoulos NG, Amérigo DA, et al. Exercise Recommendations and Practical Considerations for Asthma Management—An EAACI Position Paper. *Allergy*. 2025;80(6):1572-1591. doi:10.1111/ALL.16573 https://doi.org/10.1111/all.16573
32. Price OJ, Simpson AJ. Exercise and asthma – trigger or treatment? *Respir Med*. 2023;213:107247. doi:10.1016/j.rmed.2023.107247 https://doi.org/10.1016/j.rmed.2023.107247
33. Vassilopoulou E, Guibas G V., Papadopoulos NG. Mediterranean-Type Diets as a Protective Factor for Asthma and Atopy. *Nutrients 2022, Vol 14, Page 1825*. 2022;14(9):1825. doi:10.3390/NU14091825 https://doi.org/10.3390/nu14091825
34. Poursoleiman F, Sasanfar B, Behniafard N, et al. Adherence to a modified Mediterranean diet and in association with asthma and wheezing in schoolchildren: A cross-sectional study. *World Allergy Organization Journal*. 2024;17(11):100948. doi:10.1016/J.WAOJOU.2024.100948 https://doi.org/10.1016/j.waojou.2024.100948

35. Trincianti C, Naso M, Tosca MA, Ciprandi G. Vitamin C in Allergy Mechanisms and for Managing Allergic Diseases: A Narrative Review. *Children 2025, Vol 12, Page 718*. 2025;12(6):718. doi:10.3390/CHILDREN12060718 https://doi.org/10.3390/children12060718
36. Ghalibaf MHE, Kianian F, Beigoli S, et al. The effects of vitamin C on respiratory, allergic and immunological diseases: an experimental and clinical-based review. *Inflammopharmacology 2023 31:2*. 2023;31(2):653-672. doi:10.1007/S10787-023-01169-1 https://doi.org/10.1007/s10787-023-01169-1
37. Mansour-Gueddes S Ben, Saidana-Naija D. Vitamin E: Natural Antioxidant in the Mediterranean Diet. Published online October 6, 2021. doi:10.5772/INTECHOPEN.99705
38. Cook-Mills JM, Averill SH, Lajiness JD. Asthma, allergy and vitamin E: Current and future perspectives. *Free Radic Biol Med*. 2022;179:388-402. doi:10.1016/J.FREERADBIOMED.2021.10.037 https://doi.org/10.5772/intechopen.99705
39. Liu M, Wang J, Sun X. A Meta-Analysis on Vitamin D Supplementation and Asthma Treatment. *Front Nutr*. 2022;9:860628. doi:10.3389/FNUT.2022.860628 https://doi.org/10.3389/fnut.2022.860628
40. Jamalvandi M, Sasanfar B, Nafei Z, Behniafard N, Jafari M, Salehi-Abargouei A. Dairy intake in association with asthma symptoms among a large sample of children and adolescents: a cross-sectional study. *Front Nutr*. 2024;11. doi:10.3389/FNUT.2024.1298704 https://doi.org/10.3389/fnut.2024.1298704
41. Kuder MM, Nyenhuis SM. Optimizing lifestyle interventions in adult patients with comorbid asthma and obesity. *Ther Adv Respir Dis*. 2020;14. doi:10.1177/1753466620906323 https://doi.org/10.1177/1753466620906323
42. Peters U, Dixon AE, Forno E. Obesity and asthma. *J Allergy Clin Immunol*. 2018;141(4):1169-1179. doi:10.1016/J.JACI.2018.02.004 https://doi.org/10.1016/j.jaci.2018.02.004
43. Tashiro H, Kurihara Y, Kuwahara Y, Takahashi K. Impact of obesity in asthma: Possible future therapies. *Allergology International*. 2024;73(1):48-57. doi:10.1016/J.ALIT.2023.08.007 https://doi.org/10.1016/j.alit.2023.08.007
44. Abed BN, Ani IA, Al-fahham AA. Effectiveness of Dietary Control on The Severity and Frequency of Asthmatic Attacks. *International Journal of Medical Science and Dental*

Health. 2026;12(01):78-86. doi:10.55640/IJMSDH-12-01-11 https://doi.org/10.55640/ijmsdh-12-01-11

45. Wu X, Gao S, Lian Y. Effects of continuous aerobic exercise on lung function and quality of life with asthma: a systematic review and meta-analysis. *J Thorac Dis*. 2020;12(9):4781-4795. doi:10.21037/JTD-19-2813 https://doi.org/10.21037/jtd-19-2813
46. Parsons JP, Hallstrand TS, Mastronarde JG, et al. An Official American Thoracic Society Clinical Practice Guideline: Exercise-induced Bronchoconstriction. 2013;187(9):1016-1027. doi:10.1164/RCCM.201303-0437ST https://doi.org/101164/rccm201303-0437ST
47. Pitzner-Fabricius A, Dall CH, Henriksen M, et al. Effect of High-Intensity Interval Training on Inhaled Corticosteroid Dose in Asthma Patients: A Randomized Controlled Trial. *Journal of Allergy and Clinical Immunology: In Practice*. 2023;11(7):2133-2143.e8. doi:10.1016/j.jaip.2023.04.013 https://doi.org/10.1016/j.jaip.2023.04.013
48. Evaristo KB, Mendes FAR, Saccomani MG, et al. Effects of Aerobic Training Versus Breathing Exercises on Asthma Control: A Randomized Trial. *Journal of Allergy and Clinical Immunology: In Practice*. 2020;8(9):2989-2996.e4. doi:10.1016/J.JAIP.2020.06.042 https://doi.org/10.1016/j.jaip.2020.06.042