Exercise-induced Bronchoconstriction

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KEYWORDS

• Asthma • Exercise • Exercise-induced bronchoconstriction • Bronchoprovocation • Diagnosis • Athletes • Treatment

KEY POINTS

- Exercise-induced bronchoconstriction (EIB) occurs in individuals with and without chronic asthma.
- The symptoms of EIB are often subtle and difficult to differentiate from normal manifestations of intense exercise.
- Diagnosis of EIB based on subjective symptoms alone is extremely inaccurate.
- Objective testing is strongly recommended to document a diagnosis of EIB.
- Treatment of EIB with a short-acting bronchodilator before exercise is 80% effective.
- If short-acting bronchodilators are used daily for prophylaxis, controller agents such as inhaled steroids should also be added.
- Adjunctive treatment approaches (adequate warm-up, allergen avoidance, dietary modification, etc.) may also be helpful.

INTRODUCTION

Exercise-induced bronchoconstriction (EIB) describes acute, transient airway narrowing that is provoked by exercise. EIB is characterized by symptoms of cough, wheezing, shortness of breath, fatigue, and/or chest tightness during or after exercise. Exercise is a very common trigger of bronchoconstriction in asthmatics, and 80% of all individuals with chronic asthma experience exercise-induced respiratory symptoms at some point.[1] EIB also occurs in up to 10% of subjects who are not known to be atopic or asthmatic.[2] This cohort does not have the typical features of chronic asthma (ie, nocturnal symptoms, multiple triggers, impaired lung function), and exercise may be the only trigger that causes such individuals respiratory symptoms.

EIB also occurs quite commonly in athletes, and prevalence rates of bronchoconstriction related to exercise in cohorts of athletes range from 11% to 50%.[3] This

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wide variability in reported prevalence rates, in part, is a consequence of variable testing methods, thresholds for diagnosis, and participant populations. EIB is prevalent in endurance sports in which ventilatory load is increased for extended periods of time during training and competition (ie, soccer, lacrosse, swimming, long-distance running)[4]; however, EIB can occur in any setting. EIB also occurs commonly in cold weather and winter sports athletes.[5] In addition, environmental triggers may predispose certain populations of athletes to an increased risk for development of EIB. Chloramine compounds in swimming pools[6] and chemicals related to ice-resurfacing machinery in ice rinks[7] may put exposed athletic populations at additional risk. Athletic fields in urban or high-traffic areas for vehicles may be more likely to cause EIB symptoms.[8]

Despite how prevalent EIB is, the actual prevalence of EIB may actually be underestimated for multiple reasons. Patients with asthma and EIB have been shown to be poor perceivers of symptoms of bronchospasm.[9,10] Athletes, specifically, often suffer from lack of awareness of symptoms suggestive of EIB.[11,12] Furthermore, if they do recognize they have a medical problem, they often do not want to admit to health personnel that a problem exists due to fear of social stigma or losing playing time.[13] In addition to this lack of self-perception, health care providers, parents, and coaches also may not consider EIB as a possible explanation for respiratory symptoms occurring during exercise. Athletes are generally fit and healthy and the presence of a significant medical problem often is not considered. The athlete is often considered to be "out of shape," and vague symptoms of chest discomfort, breathlessness, and fatigue are not interpreted as a pathologic problem.

DIAGNOSIS

The clinical manifestations of EIB are extremely variable and can range from impairment of athletic performance (most cases) to severe bronchospasm and respiratory failure (less common, yet still possible). Common symptoms include coughing, wheezing, chest tightness, and dyspnea. More subtle evidence of EIB includes fatigue, symptoms that occur in specific environments (eg, ice rinks or swimming pools), poor performance for conditioning level (running/swimming slower than expected times), and avoidance of activity (very common in school-aged children) (**Box 1**).

Generally, exercise at a workload representing at least 80% of the maximal predicted oxygen consumption for 5 to 8 minutes is required to generate an episode of EIB.[14] If the onset of symptoms occurs more quickly after starting exercise, then EIB is less likely. Typically, most people experience transient bronchodilation initially during exercise, and symptoms of EIB begin later or shortly after exercise. Symptoms may

Box 1
Common symptoms of EIB

- Dyspnea on exertion
- Chest tightness
- Wheezing
- Fatigue
- Poor performance for conditioning level
- Avoidance of activity
- Symptoms in specific environments