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UNDERSTANDING AND DEALING WITH ASTHMA IN YOUNG PEOPLE

Review by Michael Chia

INTRODUCTION

Asthma is the tenth principal cause of death in Singapore with 4% of the adult population suffering from the condition. An asthmatic attack can be terrifying for both the patient and the observer, for an attack is often characterised by wheezing and a desperate fight for air. Data reported in 1998 by the Ministry of Health suggest that as many as 20% of young people in Singapore demonstrated asthmatic symptoms, and the affliction of the disease among young people appears to be increasing (MOH website). Indeed, school days lost per year among young people due to the disease are thought to be substantial, albeit there are apparently no published statistics on the matter in Singapore.

Exercise has been identified as a factor for precipitating an acute asthmatic attack. In fact, in individuals with mild asthma, symptoms may manifest only whilst exercising and not at other times. In Singapore, it is common for parents of young people who suffer asthma-like symptoms to be over-protective of their children. They do this by asking teachers to excuse their children from PE lessons, often for long stretches of time, a gesture that is often not only unnecessary but may also prove to be detrimental to the physical fitness of the children in the long term. Parents of young people with asthma in Singapore may not be aware that the physical activities during PE lessons are often less vigorous and strenuous than those which young people may be engaged in

during unstructured play. Many guardians of young people with asthma are also not aware that young people with asthma are capable of achieving high levels of success in competitive athletics. For example, Nicolette Teo, a 14-year-old Singaporean schoolgirl who won a gold medal in swimming at the 1999 South East Asian Games hosted in Brunei is a young person with managed asthma. It appears that with proper management of the disease, young people with asthma can fully participate in the normal range of physical activities.

It appears that the nexus between asthma and exercise can be described as paradoxical, since exercise can induce an episode of asthma; yet regular exercise and physical activity play important roles in the management of the disease. As young people spend nearly half their waking hours in school, an informed understanding of the etiology of exercise induced asthma (EIA) and how to deal and ameliorate the severity of such conditions among teachers is of paramount importance. Physical education teachers, and teachers in general, must be empowered with the necessary information as to how best to help the young person with asthma as the episode of asthmatic attacks are not merely restricted to physical education lessons, but can occur anytime and anywhere.

If proper precautions are taken and exercise and activity sessions are carefully managed, the young person with asthma does not have

to forego the positive benefits that exercise can provide. Importantly, cultivating a proactive approach in managing asthma without the avoidance of exercise and physical activity can help the growing young person with asthma reap the health benefits of exercise without any compromise to safety. This article reviews the literature on EIA, discusses the factors of exercise and the environment that trigger asthma, and highlights the non-pharmacological strategies that teachers can employ in the amelioration and prevention of EIA.

REVIEW OF RESEARCH

Clinical features of EIA

The characteristics of EIA are summarised here:

- requires between three and eight minutes of exercise at 80% or more of maximal heart rate;
- usually no bronchoconstriction during exercise;
- peak symptoms occur at between eight and 15 minutes after exercise;
- fall in Forced Expiratory Volume in 1 second (FEV1) of between 10 and 15% or more after exercise;
- spontaneous recovery usually within 90 minutes;
- refractory period of up to three hours after initial exercise bout;

In essence, the occurrence of EIA is preceded usually by three to eight minutes of exercise. Typically there may coughing,

wheezing, chest tightness, chest pain or any combination of these symptoms during exercise, or more so characteristically, eight to 15 minutes after the exercise bout, with resolution after 30-90 minutes (Tan and Spector, 1998). Sometimes, the symptoms re-appear some four to eight hours later. Even though EIA have been typically observed after exercise, some studies suggest it may occur during exercise, especially during prolonged exertion (Tan and Spector, 1998).

Should the young person with asthma attempt to exercise again after the symptoms have subsided, the asthma symptoms that follow the second bout of exercise may be fewer and/or less severe. This has been referred to as the refractory period. The duration of this refractory period has been reported as between 40 minutes and three hours (Tan and Spector, 1998), and the depletion of catecholamines following the first exercise bout has been offered as reason to explain the refractory period. Some authors are critical of the use of the term 'refractory period' arguing that the patient is only refractory to exercise but is not refractory to other asthma allergens (McFadden, Lenner and Strohl, 1986).

What triggers asthma?

Asthma has been known to be triggered by stimuli such as pollen, animal dander, dust mites, smoke, cold and dry air, respiratory infections, exercise and even anxiety or excitement. During an asthmatic attack, the airway narrows in response to the asthmatic trigger because the smooth muscle layer of the bronchi go into spasm, the inner lining becomes inflamed and increases mucus production into the airway. These bodily reactions result in the narrowing of the airways and more effort is needed to move

air in and out, thus explaining the characteristic wheezing of an asthmatic attack.

Exercise as the trigger for asthma

The rate and volume of ventilation is directly related to the intensity of the exercise. It is the nature of the ventilation or breathing that is provoked by the exercise, and not the kind of exercise that is crucial in EIA. Therefore, it appears that any form of exercise can lead to EIA if it is done severely enough or for long enough to increase the volume and rate of air inhaled (Tan and Spector, 1998). The intensity of exercise is important because it is directly proportional to the amount of ventilation. Vigorous activities like basketball and soccer can trigger a more severe asthmatic attack than less vigorous activities such as light jogging, brisk walking or tennis. This is especially so when no warm-up precedes the vigorous exercise and no gradual warm-down are done after the exercise. Even so, the young person with asthma who is more physically fit and involved in intermittent intensity sports is less likely to suffer severe disease symptoms than someone else with asthma who has a lower level of physical fitness.

In terms of environmental conditions that are more likely to trigger an asthmatic attack, cool and dry air worsens the cooling of the airway and exacerbates the symptoms of the disease. Therefore exercising in the morning when the air is cooler is likely to be more problematic for the young person with asthma than exercising in the afternoon. Therefore skaters on ice who have asthma are more likely to have EIA because of the cold environment. Covering the nose and mouth whilst exercising in cold weather has been effective in ameliorating

the severity of EIA. The use of a mask or a scarf that covers the mouth and the nose helps to warm the inhaled air. Swimming has been recommended to many young people with asthma because the warm and humidified air around the swimming pool allows greater exertion without the exacerbation of asthma.

A 'refractory period' occurs up to several hours after recovery from EIA. Young athletes with asthma can take advantage of this 'refractory period' by warming up before vigorous exercise. The warm up induces a 'refractory period' during which there are fewer and less severe asthma symptoms with the actual exercise (Reiff, Nozhat and Neil, 1989). It appears therefore that athletes with asthma can train at higher exercise intensities during the refractory period without evoking severe asthmatic symptoms. Warming down, or a gradual decrease in exercise intensity, is apparently just as important in reducing EIA. It is thought that warming down may decelerate the re-warming of the airways and therefore results in less obstruction of the airway (McFadden, 1995).

Preventative therapy for EIA

Prevention is the primary form of therapy for EIA. There are non-pharmacological and pharmacological measures that can be taken to prevent or lessen EIA. The pharmacological measures in the treatment of childhood asthma have been reviewed elsewhere and will not be repeated in this review. The non-pharmacological measures for EIA are summarised here:

- Warm up gradually for least 10 minutes before the actual exercise bout.
- Cover the mouth and the nose with scarf

or mask when exercising in a cool environment.

- Where possible, exercise in warm and humidified environments.
- Warm down or gradually lower the intensity of exercise without stopping the exercise abruptly.

Good aerobic fitness and a programme of active general exercise reduce the likelihood of young people with asthma having severe symptoms of EIA. A regular programme of moderate exercise can achieve this. Brisk walking and swimming are good initial activities for young people with asthma. Young people with asthma who practise effective asthma strategies such as those outlined in Table 2, have fewer attacks and less severe attacks of EIA. Additionally, the awareness and avoidance of allergens such as pollen and animal dander in the environment will also prevent the concomitant aggravation of the asthmatic condition by the allergens or exercise. The regular and proper use of anti-inflammatory medications, for example inhaled

corticosteroids that are prescribed by the family doctor can also decrease chronic airway inflammation and the baseline obstruction of the airway (Freezer et al, 1995).

As mentioned previously, cold and dry air aggravates EIA and warm and humidified air ameliorates symptoms of EIA. Hence using a scarf to cover the nose and mouth while exercising in cold air or in the early hours of the morning is helpful because the expired air can warm the air to be inhaled. Exercising in the afternoon or in environments with warm and humidified air can prevent or diminish EIA. Young athletes with asthma can take advantage of the refractory period by warming up for at least 10 minutes before vigorous exercise. The warm up can also consist of a regime of repeated short sprints (Varray and Prefaut, 1992). Warming down, instead of stopping the exercise abruptly is also crucial in reducing the severity of EIA. The warming down or gradual reduction in exercise intensity make airway re-warming and the resultant vascular dilation and oedema more gradual and less intense (McFadden, 1995).

IMPLICATIONS FOR TEACHERS

Several important implications can be drawn from the studies reviewed in this article, which professionals dealing with young people with managed asthma could take note of.

1. Encourage young people with managed asthma to engage in normal physical activity including physical education.

The physical fitness of young people with asthma may initially be lower than their healthy peers but when they increase their habitual physical activity and participate in general fitness development programmes, improvements in physical fitness and their capacity for physical activities

can be expected. Previously, young people with asthma may have been erroneous in avoiding exercise for fear of triggering off adverse EIA. This may have in turn resulted in decreased physical fitness that can exacerbate EIA. With an effective asthma management strategy that includes physical activity and exercise, young people with asthma are capable of the normal range of physical activities.

2. *If asthma medication has been prescribed, take it in accordance with the doctor's instructions either before or after engaging in exercise.*

An asthma management strategy that includes both pharmacological and non-pharmacological approaches is more holistic in nature and is also likely to be more effective. This allows young people with asthma to take their medication before or after embarking on any challenging physical activity.

3. *Where possible, exercise with warm inspired air.*

Allowing the young person with asthma to wear a scarf around the face or wearing a simple mask over the nose and mouth when exercising in cooler environments can increase the temperature and humidity of the inspired air.

4. *Make active efforts to warm-up appropriately before vigorous physical activity.*

This takes advantage of the refractory period. Warm-up 30 to 90 minutes before doing very intense physical activity. The best warm-up for preventing EIA is best determined by the individual, based on past experience, and will likely vary from one young person to another and perhaps from sport to sport.

5. *Always warm-down gradually following vigorous physical activity.*

Both warm-up and warm-down exercises should be part of any exercise routine that the young person with asthma embarks on. Warming down or a gradual decrease in the exercise intensity before stopping will prevent any rapid changes in the rate of and volume of ventilation that have been contraindicated in EIA.

6. *Select the appropriate sport or physical activity.*

Some activities such as swimming, 'stop-and-go' sports and lifting, throwing and jumping events are thought to be of low 'asthmagenicity' compared to more intense and vigorous sports played in cold and dry environments. Nevertheless, with proper medication and effective asthma management, young people with asthma can enjoy a wide variety of physical activities and sports.

Conclusion

Asthma, including that triggered off by exercise, is a significant problem among young people in Singapore. Poor management and/or uncontrolled EIA can lead young people to avoid physical activity and sports unnecessarily. This can lead to the lifelong adoption of a sedentary lifestyle, and therefore make them susceptible to an increased risk of contracting hypokinetic diseases. Prevention is the main approach to the management of EIA. There are common sense measures for diminishing EIA that young people with asthma can take before and after exercise. These measures are best combined with asthma medications prescribed by family doctors. Good long-term control of EIA and increased physical fitness, especially aerobic fitness can also reduce the deleterious response to exercise.

It is fortunate that the majority of young people with asthma are able to engage in a normal active life, including competitive athletics. An active participation of exercise and sports with proper asthma management confers many benefits to the young person with asthma- a widened spectrum of physical activity to be enjoyed, an improved physical fitness, a lower anxiety about exercise and sport, a better control of EIA and an improved self-image. Education on the nature of EIA and how to control it with or without medication needs to be taken on board by both young people with asthma, their family members, teachers, and coaches. Only then can young people with asthma continue to maintain a normal and active lifestyle and attain their full physical potential.

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