

FEATURE

LONDON 2012 OLYMPICS

What can we learn from asthma in elite athletes?

As Olympic competitors are told they no longer need authorisation for using the most common inhalers, **Sophie Arie** looks at why asthma seems so common in elite athletes and the lessons that could be of huge benefit to the general public

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As Olympic athletes prepare for the London 2012 games, there is one thing that many are relieved they won't have to worry about in future. As of this year, those with asthma no longer have to seek authorisation to use the most common inhalers.

Asthma in elite athletes has gradually risen at almost every Olympic Games since the 1970s. At the Atlanta Games in 1996 some 20% of the US team declared problems with asthma,¹ and almost 21% of Team GB had asthma in 2004 tests,² compared with 8% of the British population.³

Why more asthma in athletes?

Little was understood about why athletes would have more problems with asthma than the ordinary population, and suspicions grew that some athletes might be declaring themselves asthmatic out of a belief that inhaled β_2 agonists, the bronchodilator drugs used to prevent and relieve symptoms, could enhance their performance.

In 2001, the International Olympic Committee Medical Commission introduced clinical tests before authorising each athlete to use inhaled β_2 agonists. The International Olympic Committee said its concern was for the health of the athletes, and although testing did not bring the numbers down substantially it did expose the need for much closer attention

to the problem—some had been misdiagnosed and others had asthma without realising it.

Asthma remains the most common health problem among elite athletes. So why do so many athletes have it? And do the drugs they use to control it affect their performance?

Certain facts are known: asthma symptoms are most often provoked by intense exertion over long periods and cold air and the chemicals in swimming pools can exacerbate lung problems. Endurance athletes, skiers, swimmers, cyclists, ice skaters, and canoeists are particularly susceptible. Ventilation rates higher than those of the normal population also mean that athletes are more exposed than the normal population to pollution and to allergens.

Sergio Bonini, professor of internal medicine at the Second University of Naples, Italy, believes that the sheer hours of extreme exercise that athletes put in can bring on fully blown asthma in those who previously did not have it. He also believes that athletes are generally more prone to allergies than the general population and that makes them more susceptible to asthma as well. "Strenuous and continued exercise and training increase the types of cells that cause allergy and asthma," he says.

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Video on bmj.com (see also <http://bmj.com/video>)



Asthma doesn't preclude success, as gold medal winning runner Liz McColgan explains in this video. We also look at diagnosis and treatment of asthma in Olympic level athletes

Prevalence depends on level of athlete

It seems that the higher the level of athlete, the higher the prevalence of asthma. Athletes who are “only” competing at Commonwealth Games level, rather than Olympic level, have higher prevalence than the ordinary public but lower than Olympic teams. Some 10.5% of the 600 would be Scottish competitors in the Commonwealth Games who train at the Scotland Institute of Sport have asthma, according to Brian Walker, head of sports medicine there.

Athletes are also perhaps more willing to accept being labelled asthmatic than the general public because of their need to manage the problem. But many have felt confused and stigmatised by years of debate over the potential effect of asthma drugs on their performance.

A combination of short acting and long acting β_2 agonists with inhaled corticosteroids is widely recommended as the best way to control asthma. But the World Anti-Doping Agency (WADA) classified all inhaled β_2 agonists as banned substances in 2009.

Banning inhaled β_2 agonists

A flurry of research studies has since convinced many that there is no need for any inhaled β_2 agonists to be banned. A review by nine international experts looked at 39 separate studies involving 575 people and concluded that “there is no evidence that inhaled β_2 agonists improve aerobic or anaerobic capacity.”⁴ And in 2010 WADA dropped the requirement of a therapeutic use exemption—the paperwork produced once an athlete tests positive for asthma—for the use of salbutamol and salmeterol, and now only requires a simplified declaration of use. And since January 2012, WADA has allowed formoterol, another common asthma drug, to be used “in therapeutic doses.”⁵ Oral β_2 agonists and oral corticosteroids have been found to have an ergogenic effect, so that form of treatment remains banned.

In spite of it all . . .

Don McKenzie, professor at the Allan McGavin Sports Medicine Clinic at the University of British Columbia, and Ken Fitch, adjunct professor at the School of Sports Science, Exercise, and Health at the University of Western Australia, point out, in a paper published in the *Clinical Journal of Sports Medicine*,⁶ that asthmatic athletes have consistently outperformed healthy athletes in every Olympic games since 2000. Unpublished data from the IOC Independent Asthma Panel show that 19.1% of swimmers were approved to use inhaled β_2 agonists at the Beijing Olympics and won 32.9% of the individual medals awarded. Also, 17.3% of cyclists were permitted to use inhaled β_2 agonists and won 28.9% of individual medals. And so far it is still not understood why.

How do they do it?

“Do these physiological changes associated with asthma represent a training stimulus not available to the non-asthmatic athlete? Is there a unique genetic profile of the asthmatic athlete and their response to training and medication?” ask McKenzie and Fitch.

So how do they manage to perform so well, despite their obvious handicap? Is it down to them having the best methods for managing the illness? Or is it sheer determination to overcome a handicap? Or do their lungs end up adapting better to the disease than those of the average person because of hours of training and extreme exertion?

Because of their ambitions, athletes with help from their doctors have not only learnt to manage their condition, but they have found the most effective ways to do so while still training hard.

“Athletes can teach people the importance of asthma planning, education and the importance of when to go and see your doctor,” says John MacLean, the doctor for the Scottish national football team and head of sports medicine at Glasgow National Stadium.

His patients have learnt that a long warm up is essential and have developed breathing techniques and tricks with their inhalers that help them avoid attacks during matches.

“We get athletes to take β_2 inhalers at the beginning of their warm up and then do strenuous warm up and take a β_2 inhaler at the end. They get a refractory period following which their tubes won’t narrow again. And usually they can then manage an hour or hour and a half of football or whatever.”

Exercise induced asthma

Questions still remain over whether athletes might be harming themselves by overusing asthma drugs or simply misusing drugs because of misdiagnosis of the condition.

For a start, many athletes might have exercise induced asthma—exercise induced bronchoconstriction, or EIB—which is not considered by some to be “real” asthma, and can be treated with different drugs to full blown asthma.

“As my athletes go up the achievement ladder we pick up asthma in them as they progress,” says Brian Walker. “There are folks that would be asthmatic if they weren’t athletes and there are folks that are only asthmatic in an athletic situation.”

Walker believes most of his athletes have exercise induced asthma. But he has no proof.

Even the Olympic committee’s rigorous testing has identified only those with a certain level of breathing difficulty when exercising to a specific level. But it did not distinguish between cases of asthma and cases of exercise induced bronchoconstriction.

Bonini is pretty sure that “the asthma levels [in athletes] might be the same [as in the general public], plus perhaps 1% more because of allergies. But the difference in prevalence is because of EIB.”

Bonini argues that because of the lack of clarity about who has exercise induced bronchoconstriction and who has asthma and exercise induced bronchoconstriction combined, many athletes are often not using the best treatment for their particular condition.

“Athletes are often being given the wrong treatment,” he says. “It’s being given only through the desire to increase their performance [by controlling lung problems] and avoid doping allegations,” he says.

Although anti-leukotrienes and sodium chromoglicate are known to prevent exercise induced bronchoconstriction and are not banned by WADA, he says, many athletes are using short action inhaled β_2 agonists too much or using preventive inhaled β_2 agonists without corticosteroids—they fear the word “steroid”—and both these scenarios are potentially bad for their health.

“We need a lot more studies of the distinction between [those who have] EIB and [those who have] EIB and asthma,” he says. “It’s a crucial issue that should be addressed.”

The right treatment

Misuse of drugs can have long term implications for any patient, athlete or not.

Using short action inhaled β_2 agonists alone, just to stave off imminent attacks or stop an attack, is thought to have a negative effect on the condition in the long term. Although easing the immediate symptoms initially, the patient is thought to develop rapid immunity to the short action inhaled β_2 agonists. This can mean that the underlying condition far from being treated, worsens over time.

Most athletes with asthma now understand that preventive treatment—using long action β_2 agonists—controls the symptoms the best. Well known figures such as the UK's Paula Radcliffe—the women's world marathon record holder—now use long action inhalers more systematically with the result that they barely need to use the short action inhaled β_2 agonists, “emergency” inhalers.^{7 8}

“The key message is that short acting β_2 agonists are emergency medication. Athletes when well controlled should not be using them,” says Greg Whyte, former director of research for the British Olympic Association and professor of applied sport and exercise science at Liverpool John Moores University.

“The point is that asthma needs to be controlled and you don't control it with short acting medication,” Whyte says.

This and many other lessons athletes are learning has exposed widespread problems in diagnosing and treating asthma correctly. And these are lessons that could potentially be of huge benefit to the general public.

Although there are 300 million people with asthma worldwide,⁹ the condition has not been studied as much as other conditions because it is relatively cheap to manage, and not usually a fatal disease. But too often children are diagnosed as asthmatic by their general practitioner on the basis of reported symptoms. The child then is labelled as asthmatic when breathing problems could well be related to other factors.

The years of intense lung testing required by would be Olympic competitors highlighted problems with diagnosis.

Research by John Dickinson and Greg Whyte in *Thorax* in 2005 showed that the levels of asthma in Team GB remained almost identical—around 21% compared with 8% in the general public—in 2000 (pre-testing) and in 2004.²

In 2004, it turned out that 13 athletes who thought they had exercise induced asthma did not. At the same time, the tests identified seven who had no previous diagnosis but who did have exercise induced asthma.

Whyte speaks of an Olympic athlete who was taken off drugs after testing and who went on to win two gold medals. And another who had a 50% fall in forced expiratory volume in one second (FEV₁) after exercising, but she thought it was normal because she had always been that way.

“Invariably, what is happening is that diagnosis is by self reported symptoms. It's subjective. People's judgment of their own symptoms is incredibly varied.”

“The tragedy is that when you give somebody a diagnosis you effectively make them a disabled individual,” Whyte says.

“Good, accurate testing would avoid these situations.”

Whyte doesn't believe that levels in the general public would reach the same levels as in athletes if tests and monitoring were intensified. Others suspect that with closer attention and better testing the rate in the general public might be shown to be substantially higher.

Close attention to the condition in elite athletes, who have a heightened interest in understanding and managing their condition, is in many ways the best source of knowledge for the general public.

“The elite athlete is a shop window,” says Whyte. “We can learn a lot from what elite athletes do and that cascades down to the general public.”

Exercise is good for people with asthma

Perhaps the simplest but most important lesson to emerge is that scientists now agree that exercise in most people with asthma enhances their lung function and improves their quality of life.

Stefano del Giacco of the University of Cagliari, Italy, reported in June that “regular, moderate exercise can improve your asthma and also your immune system, which can also help avoid asthma attacks.”

Whyte says, “The general message is that mild exercise should be recommended to asthmatics as part of their symptom management programme.”

Because it is not life threatening, people tend just to modify their behaviour accordingly. That has important implications in terms of cessation of physical activity. But in Western populations that are already increasingly inactive and overweight, the old message that asthmatics should not do sport, could be adding to the problem.

“The negative health impact of inactivity—in terms of cost and quality of life—is far greater than that of well controlled asthma,” says Whyte.

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CORRECTIONS

What can we learn from asthma in elite athletes?

This Feature by Sophie Arie (*BMJ* 2012;344:e2556, doi:10.1136/bmj.e2556) incorrectly stated that asthma is not a “life threatening” condition.

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