



Allergologia et immunopathologia

www.elsevier.es/ai



EDITORIAL

Exercise-induced bronchospasm or dyspnoea in obese children?

Exercise-induced bronchospasm (EIB) is usually defined as one of the more common causes of exercise-induced dyspnoea (EID), causing difficult breathing during physical activity by obstruction of the airways, which is a hallmark of asthma.¹ However, dyspnoea is a complex psycho-physiological symptom characterized by sensation of an increase in the perceived work of breathing which may manifest during physical activity and resulting from many different causes.^{1,2} In clinical practice, most of the diagnoses of asthma induced by physical activity are based on the evaluation of symptoms reported by children or parents. This is often proved to be misleading because a link between the symptoms reported and the results of tests during physical activity, such as standardised exercise test, has not been demonstrated.^{1–3}

Overweight and obesity may contribute to dyspnoea during the physical activity and moreover, in recent years, several studies have investigated the correlation between obesity and chronic respiratory diseases such as asthma and EIB.⁴ Castro-Rodriguez et al. have identified five possible biological mechanisms which can explain the relationship between asthma and obesity: mechanical effects of obesity on respiratory function, altered immune response and inflammatory activation of specific gene regions, hormonal influences related to gender, and influence of diet and physical activity.⁵ The excessive accumulation of adipose tissue at the chest wall may alter the pulmonary respiratory mechanisms favouring an increase in the response of bronchial smooth muscle.⁴ Both asthma and obesity can cause excessive reduction of small airways diameter and increase gas trapping. Overweight patients have a decreased tidal air volume and functional residual capacity, with consequently more difficulties to stand physical activity. The risk of asthma developing in overweight children is higher in females than in males, and higher in those girls who have an early menarche.⁶ Indeed, obese asthmatic patients require a greater number of medications for asthma; emergency visits; hospital admissions; and accesses to emergency care, more than asthmatic children who are not overweight.⁷

In the present issue of *Allergologia et Immunopathologia*, Lopes et al.⁸ report the results of a study assessing the frequency and severity of EIB in obese adolescents. Eighty adolescents of both genders, aged 10–16 years old, were

divided into four groups: asthmatic obese, asthmatic non-obese, obese non-asthmatic, and healthy individuals, analysing how obesity can influence EIB. Every patient performed an exercise test and changes in the pulmonary function (FEV₁) have been evaluated. The study showed that obese asthmatic children have no greater risk frequency of EIB than non-obese asthmatic children (50% vs. 38%, respectively). However, maximum percent fall in FEV₁ and area above the curve, calculated to evaluate EIB severity and recovery, were significantly greater in the asthmatic obese group compared to the asthmatic non-obese group. The authors concluded that although obesity does not increase the prevalence of EIB, being overweight can indeed contribute to increase EIB severity and to delay recovery among asthmatics.⁸ All these evidences lead to consider that obese asthmatics can present difficulties in the recovery of normal pulmonary function with a consequent limitation of their participation in physical and sporting activities.

Therefore, dyspnoea during exercise in obese patients should not always be considered a manifestation of EIB, but should be placed in the differential diagnosis with other causes for EID, which include normal physiologic exercise limitation, vocal cord dysfunction, exercise-induced laryngomalacia and hyperventilation syndrome.^{1–3} Physical deconditioning, common in sedentary, obese children, is one common cause of EID, particularly in school-age children who do not have asthma, although some of these children are mistakenly diagnosed as having asthma.

The person with excess weight is most prone to the development of EID for physical characteristics which alter the lung mechanism and bronchial responsiveness.

Obesity also affects the perception of symptoms of asthma and asthma severity change through co-morbidities associated with asthma; such as gastro-oesophageal reflux, obstructive sleep apnoea and obesity hypoventilation syndrome.⁹

Epidemiological data from Glazebrook et al. have shown that most of the children with severe asthma are obese and are much less active than children in the control group.¹⁰ Although obesity per se seems not to be a risk factor for bronchial obstruction, obese patients have an increased risk for dyspnoea, and often obese asthmatic children require a

larger use of bronchodilators.¹¹ Therefore, obesity and asthma are often considered barriers to physical activity by children and their parents. The cause of this reduction in physical activity may be related to organisational policies, incorrect assessment of symptoms, family beliefs and inappropriate behaviour. Schools may be partly responsible since they often do not encourage children to participate in physical activity. Teachers are not aware of the characteristics of asthma medications and what these children need before the physical effort in order to prevent the acute attacks.¹²

Furthermore, the benefits which are available from the physical activity are not only physical. It improves mental health by increasing self-esteem, social skills and the value of physical assessment.¹³ This could be particularly relevant for the overweight asthmatics who may be limited by both conditions in the management of physical activities. It has been well demonstrated that excessive body weight is associated with additional loss of quality of life in children with asthma.¹⁴

On the contrary, the weight loss associated with a reduced physical obstruction of the airways improves PEF in obese patients with asthma. Moreover, there has been an improvement in pulmonary mechanics and better control of bronchospasm.¹⁵

In conclusion, physical activity should become an integral part of therapeutic and preventive strategies of asthma and obesity when expressed alone or simultaneously. The real bronchospasm induced by the physical activity may be recognised by specific diagnostic tools and become a sign of poor therapeutic control, not an occasion to diminish the exercise, particularly in obese asthmatic children.

References

1. Abu-Hasan M, Tannous B, Weinberger M. Exercise-induced dyspnea in children and adolescents: if not asthma then what?. *Ann Allergy Asthma Immunol.* 2005;94:366–71.
2. Weinberger M, Abu-Hasan M. Pseudo-asthma: when cough, wheezing and dyspnea are not asthma. *Pediatrics.* 2007;120: 855–64.
3. Seear M, Wensley D, West N. How accurate is the diagnosis of exercise induced asthma among Vancouver schoolchildren?. *Arch Dis Child.* 2005;90:898–902.
4. Sin DD, Sutherland ER. Obesity and the lung: 4. Obesity and asthma. *Thorax.* 2008;63:1018–23.
5. Castro-Rodríguez JA. Relationship between obesity and asthma. *Arch Bronconeumol.* 2007;43:171–5.
6. Castro-Rodríguez JA, Holberg CJ, Morgan WJ, Wright AL, Martínez FD. Increased incidence of asthma-like symptoms in girls who become overweight or obese during the school years. *Am J Respir Crit Care Med.* 2001;163:1344–9.
7. Thomson CC, Clark S, Camargo Jr CA. Body mass index and asthma severity among adults presenting to the emergency department. *Chest.* 2003;124:795–802.
8. Lopes WA, Radominski RB, Rosario N, Leite N. Exercise-induced bronchospasm in obese adolescents. *Allergologia et Immunopathologia* 2009 10.1016/j.aller.2009.03.001.
9. Deane S, Thomson A. Obesity and the pulmonologist. *Arch Dis Child.* 2006;91:188–91.
10. Glazebrook C, McPherson AC, Macdonald IA, Swift JA, Ramsay C, Newbould R, et al. Asthma as a barrier to children's physical activity: implications for body mass index and mental health. *Pediatrics.* 2006;118:2443–9.
11. Sin DD, Jones RL, Man SF. Obesity is a risk factor for dyspnea but not for airflow obstruction. *Arch Intern Med.* 2002;162:1477–81.
12. Williams B, Powell A, Hoskins G, Neville R. Exploring and explaining low participation in physical activity among children and young people with asthma: a review. *BMC Family Practice.* 2008;9:40.
13. Strauss RS, Rodzilsky D, Burack G, Colin M. Psychosocial correlates of physical activity in healthy children. *Arch Pediatr Adolesc Med.* 2001;155:897–902.
14. van Gent R, van der Ent CK, Rovers MM, Kimpen JL, van Essen-Zandvliet LE, de Meer G. Excessive body weight is associated with additional loss of quality of life in children with asthma. *J Allergy Clin Immunol.* 2007;119:591–6.
15. Hakala K, Stenius-Aarniala B, Sovijärvi A. Effects of weight loss on peak flow variability, airways obstruction, and lung volumes in obese patients with asthma. *Chest.* 2000;118:1315–21.

D. Peroni*

G. Paiola

L. Tenero

G. de Luca

Paediatric Department, University of Verona, Verona, Italy

E-mail address: peroni.diego@tiscalinet.it (D. Peroni)

*Corresponding author.