Studies Probe Links Between Childhood Asthma and Obesity

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For decades, investigators have been documenting associations between obesity and asthma in adults, although the underlying mechanisms involved have remained largely unknown. Ongoing work is revealing a link in children as well and is providing new insights into the potential basis of the association.

“Some research indicates that children with asthma experience incremental increases in body mass index (BMI) for every year after being diagnosed, while adults with later-onset asthma do not undergo significant linear changes in BMI with the duration of their condition. This may imply that in early-onset asthma, breathing difficulties may exert effects that lead to weight gain, while in late-onset asthma, obesity may have more of a causative effect on asthma,” said Rastogi. They also are less responsive to currently available asthma medications compared with normal-weight children with asthma, he said.

Rastogi’s work has shown that even small amounts of excess weight may adversely affect lung function in Hispanic and African-American children, who have a higher prevalence of asthma compared with their white counterparts (Vo P et al. J Allergy Clin Immunol. 2013;131[5]:566-63). The study found that more African American and Hispanic individuals were overweight and obese than white individuals, and that compared with their normal-weight counterparts, lung function was lower in both overweight and obese African Americans and Hispanics, while in whites, it was lower only in those who were obese (not overweight).

Obesity’s effect on asthma also may differ with sex. “It is very clear that obesity leading to late-onset nonallergic asthma is more prevalent in adult women compared with adult men, but this female predominance is not present in young children,” said Jason Lang, MD, MPH, who is the director of the Nemours Asthma Center and an associate professor at the University of Central Florida College of Medicine, in Orlando. “Several large, very methodologically sound prospective cohort studies in children have not seen a consistently higher risk in females.”

Lang added that the increased risk in females seems to start shortly after puberty. The Tucson Children’s Respiratory Study showed that girls who became obese were more likely to develop asthmatype symptoms as adolescents, suggesting a potential role for female hormones or sex differences in fat distribution (Castro-Rodríguez JA et al. Am J Respir Crit Care Med. 2001;
Mechanistic Links

Although the mechanisms that link obesity and asthma may differ by age, sex, and race/ethnicity, studies point to a common role for inflammation, with obesity-related hormones exerting proinflammatory effects that lead to airway hyperreactivity, a cardinal feature of asthma.

“We know that with obesity come higher levels of circulating ‘adipokines’ like leptin and TNF-α; leptin has been shown to penetrate the lung and contribute to alterations in inflammatory cells in the airways,” said Lang. A recent study in mice also showed that obesity stimulates production of the cytokine interleukin-17 by innate lymphoid cells in the lung (Kim HY et al. Nat Med. 2014;20[1]:54-61).


“Each of these mechanisms has supportive evidence and likely plays at least a partial role,” said Lang.

Breaking a Vicious Cycle

Although obesity has been associated with more frequent and severe asthma symptoms and the need for increased doses of medication, losing weight can be difficult for children and adults with asthma. “The link between asthma and obesity represents an interplay of factors that can create a vicious cycle,” said Lisa Cicutto, PhD, RN, who specializes in asthma management at National Jewish Health and the University of Colorado, Denver. In children, physical activity is important for proper development, socialization, and overall health, but a fear of inducing asthma symptoms may cause a child to limit daily physical activity. This leads to poor cardiopulmonary performance and conditioning, which in turn makes exercise less enjoyable. And of course, regularly restricting physical activity can contribute to weight gain, which itself makes it more difficult to control asthma symptoms.

Despite the hurdles, losing weight has been shown to provide real benefits to both adults and children with asthma. Many studies in adults have demonstrated that losing weight through diet, surgery, or pharmacologic interventions brings improvements in asthma control (Boulet LP. Clin Exp Allergy. 2013;43[1]:8-21; Sutherland ER. Ann N Y Acad Sci. doi:10.1111/nyas.12357 [published online February 12, 2014]).

“...the precise pathways that cause altered airway inflammation and other asthma-related effects in obese children and adults, he noted that “based on our current understanding, it is very likely that interventions involving the adoption of a healthy diet and establishing a normal body habitus is likely to result in normal airway function and improved asthma.”

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