

of life. In evaluating chronic cough in children, providers should base management on cough characteristics and clinical history, avoid or limit the time frame for empirical trials, and obtain a chest radiograph and spirometry (pre- and post- β_2 agonist) when appropriate. There are insufficient data to recommend the testing for airway hyperresponsiveness in all children with chronic cough and moderate-quality data to support AHR when spirometry is normal and asthma is suspected or symptoms are present.

REVIEWER COMMENTS. The evidence base supporting the 2006 CHEST Cough Guidelines approach has grown in the past decade. Protocolized approaches to managing pediatric chronic cough significantly improve clinical outcomes. In summary, it is important for providers to obtain a thorough history in children with chronic cough and then obtain a chest radiograph for all children and spirometry only for children ages ≥ 6 years. Other tests should not be routinely performed unless otherwise clinically indicated. In the meantime, we await more trials for data on some of the new recommendations that are consensus as opposed to evidence-based, particularly in primary care.

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Effects of Childhood Asthma on the Development of Obesity Among School-Aged Children

Chen Z, Salam MT, Alderete TL, et al. *Am J Respir Crit Care Med.* 2017;195(9):1181–1188

PURPOSE OF THE STUDY. To determine what effect asthma has on the development of obesity.

STUDY POPULATION. A total of 3474 children from 8 different southern California communities were enrolled and followed prospectively. A total of 2706 of these children were nonobese at study entry and were included in the primary analysis.

METHODS. Nonobese children were followed and examined annually or biannually from kindergarten or first grade through high school. Questionnaires were completed periodically by parents until study year 5, then by the children until completion of the study. Children were classified as having asthma if they reported being diagnosed with asthma by a physician.

RESULTS. Children with asthma at baseline were 51% more likely to develop obesity than children without asthma (HR, 1.51; 95% CI, 1.08–2.10), even when controlling for multiple variables. However, new-onset asthma during the study was not found to be associated with increased risk of obesity (HR, 0.90; 95% CI, 0.52–

1.55). The use of asthma rescue medications at baseline was associated with a reduced risk of obesity (HR, 0.57; 95% CI, 0.33–0.96). Conversely, the use of any controller medications was not associated with incidence of obesity (inhaled corticosteroid: HR, 0.97; 95% CI, 0.49–1.93) (nonsteroid controller: HR, 1.34; 95% CI, 0.35–4.97).

CONCLUSIONS. Asthmatic children may be at increased risk of developing obesity. The use of asthma rescue medications may be helpful in reducing that risk.

REVIEWER COMMENTS. There are multiple studies that have suggested that obese children are more likely to have asthma and severe asthma symptoms. However, it is unclear whether children with asthma are at higher risk for obesity. This prospective study followed nonobese children for up to 10 years and found a higher incidence of obesity in asthmatics compared with nonasthmatics. This risk was found to be maintained even when controlling for physical activity level. The authors do acknowledge that details collected regarding physical activity were limited. A better understanding of the interplay between asthma and obesity as well as early identification and management of asthma and obesity risk may be helpful in reducing morbidity.

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Perceived Exercise Limitations in Asthma: The Role of Disease Severity, Overweight, and Physical Activity in Children

Westergren T, Berntsen S, Lødrup Carlsen KC, et al. *Pediatr Allergy Immunol.* 2017;28(1):86–92

PURPOSE OF THE STUDY. To determine if perceived exercise limitation (EL) in asthmatic children was associated with lung function, demographic factors, and/or other medical comorbidities.

STUDY POPULATION. The study included 302 Norwegian children (64% male) with asthma from the Environment and Childhood Asthma birth cohort, evaluated at their 10-year follow-up.

METHODS. The 302 children selected from the cohort had no respiratory infection in the preceding 4 weeks and met 2 of 3 criteria for asthma: symptoms consistent with asthma, a physician's diagnosis of asthma, or use of asthma medications. These subjects underwent evaluation of exercise-induced bronchospasm (EIB, assessed by FEV₁ pre- and postexercise), bronchial hyperresponsiveness (BHR, assessed by methacholine challenge), a structured interview composed of demographic information and perceived exercise limitations, anthropometric data, and calculation of an

asthma severity score. Associations were evaluated through multivariate logistic regression analysis.

RESULTS. A total of 20% (58) of the asthmatic children reported EL. In this group, 8 factors differed significantly compared with those without reported EL; however, after multivariate analysis, only asthma severity score (OR 1.49; 95% CI 1.32–1.67) and overweight status (OR 2.35; 95% CI 1.14–4.82) were independently associated with perceived EL. In a model excluding asthma severity score, additional associations included prenatal smoking, comorbid allergic rhinitis (AR), and children with comorbid AR and atopic eczema. EIB and BHR were associated with EL, only with exclusion of asthma severity and allergic disease from the analysis. Physical activity, sex, and household income were not risk factors for EL. Overweight status remained significant in all models of multivariate analysis reported in this study.

CONCLUSIONS. Perceived EL in asthmatic children was independently associated with overweight status and asthma severity score but was not associated with daily physical activity or socioeconomic factors. Being overweight more than doubles the probability of perceived EL.

REVIEWER COMMENTS. This study highlights the link between exercise limitation in asthmatic children and being overweight. Many studies regarding exercise limitation in asthma focus on children under specialty care. Results from population-based cohort studies such as this likely reflect more accurately the experience of pediatricians. While factors such as allergic disease and asthma severity may have some effect on perceived exercise limitation, the association with overweight status appears more robust. Awareness of this association may lead to increased focus on weight control for asthmatic children reporting exercise limitation to their pediatrician.

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Sex Differences in the Relationship Between Fitness and Obesity on Risk for Asthma in Adolescents

Lu KD, Billimek J, Bar-Yoseph R, Radom-Aizik S, Cooper DM, Anton-Culver H. *J Pediatr.* 2016;176:36–42

PURPOSE OF THE STUDY. To examine the association of obesity and fitness on risk of asthma in adolescent girls and boys.

STUDY POPULATION. Cross-sectional analysis of data of 4828 subjects, 12–19 years old, from the 1999–2004 NHANES. Mean age of males was 15.5 years and mean age of females was 15.3 years.

METHODS. Data including cardiorespiratory fitness testing (submaximal treadmill exercise test), body composition measurements, and respiratory questionnaires from NHANES were used. Asthmatics were defined as those who responded “yes” when asked whether a doctor or health professional had told them they had asthma. Participants were classified as normal weight if sex-specific BMI percentile-for-age was fifth to <85th, overweight if 85th to <95th, and obese if ≥95th. Comparisons of subjects’ characteristics were done for continuous variables with an independent sample *t* test and for categorical variables with a Pearson χ^2 test; then, sex-specific associations of BMI and fitness with prevalence and morbidity were analyzed with logistic regression models, stratified by sex.

RESULTS. In females, being overweight or obese was associated with increased odds of history of or current asthma (aOR 1.63, 95% CI 1.16–2.3; aOR 1.73, 95% CI 1.13–2.64) in addition to asthma attacks (aOR 2.67, 95% CI 1.56–4.65) and exercise-related wheezing (aOR 1.6, 95% CI 1.07–2.38). This association was not seen in males. In males, there was an association between high fitness and lower odds of asthma-related visits to the emergency department (aOR 0.24, 95% CI 0.07–0.89), wheezing-related medical visits (aOR 0.31, 95% CI 0.13–0.75), wheezing-related missed days (aOR 0.14, 95% CI 0.06–0.33), and exercise-related wheezing (aOR 0.43, 95% CI 0.06–0.33), but this was not observed in females.

CONCLUSIONS. This study found that, in adolescent females, there is an association between overweight/obesity and increased asthma prevalence and morbidity, independent of fitness. In adolescent males, there is an association between high fitness and decreased rates of asthma morbidity that is independent of weight categorization. This suggests that the prevalence and morbidity of asthma are affected differently in adolescent females as compared with adolescent males.

REVIEWER COMMENTS. It has been suggested before that there are gender differences in the effects of obesity on prevalence and morbidity of asthma, though there are few studies examining an adolescent population or that also consider fitness. As the authors noted, there is insufficient evidence to conclude that the observed differences were true as opposed to simply by chance. However, others have also noted this relationship between obesity and asthma in females, though it is unclear why this may be. More females reported wheezing related to exercise, which begs the question of directionality. Furthermore, if obesity is related to the development of and morbidity associated with asthma in females, there are likely a multitude of players in this complex relationship, including hormones, puberty, adipokines, adipose distribution, and inflammation, whose potential roles have yet to be elucidated. Nevertheless, the mechanisms in which obesity may predispose females to asthma and associated morbidity and, conversely, those related to high fitness that potentially

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