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EDITORIAL

Smoking: it's still a big problem in children with asthma☆,☆☆

Tabagismo: ainda é um grande problema em crianças com asma

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Smoking is an independent risk factor for the development of asthma symptoms,[1] loss of lung function,[2] and asthma exacerbations.[3] The mechanisms of smoking-related lung disease can include increased small-airway inflammation with neutrophils and macrophages, airway hyper-responsiveness, and airflow obstruction.[4,5] Additionally, patients with asthma who smoke have a reduced response to inhaled corticosteroids.[6] The effect of smoking on asthmatic lungs also appears to increase the development of features of chronic obstructive pulmonary disease (COPD), and there is an increasing body of knowledge about an asthma-COPD overlap syndrome. Most adults who smoke regularly started the habit as adolescents. The Global Initiative for Asthma (GINA) guidelines stresses the critical importance of identifying modifiable risk factors for exacerbations, such as smoking.[7] It also asks healthcare providers to encourage smokers to quit at every visit and provide access to counseling and resources.

Tobacco use worldwide peaked in the 1980s and is now decreasing. While the highest rates of smoking are currently in developed countries; the prevalence of smoking is actually decreasing in developed countries and increasing in developing countries. Globally, over 24 million children aged 13–15 years smoke cigarettes.[8] In Brazil, a concentrated effort to control tobacco use has led to a decrease in smoking rates. However, the 2009 Global Youth Tobacco Survey in São Paulo estimated that nearly 30% among adolescents aged 13–15 years use tobacco products.[8]

In this issue, Jordão et al.[9] aimed to study the associations between degrees of active smoking, smoke exposure, and reported asthma in 66,394 adolescents (age 12–17 years) in Brazil through a multicenter, national, school-based questionnaire study. Data were collected between March and December of 2013 and 2014. They defined smoking exposure as: ''experimentation,'' for those who have smoked cigarettes at least once in their lives; ''current smoking,'' for those who have smoked cigarettes on at least one day in the past 30 days; ''regular smoking,'' for those who have smoked cigarettes for at least seven consecutive days in the past 30 days; and ''passive smoking,'' for those who had at least one smoker in the household. Current asthma was characterized as the presence of at least one wheezing crisis attack in the last 12 months, a similar definition to that used in the International Study of Asthma and Allergies in Childhood (ISAAC).[10] Severe asthma was defined

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as the presence of at least one wheezing crisis attack in the last 12 months.

The prevalences of smoking exposure were 18%, 25%, 12%, and 28% for experimentation, current smoking, regular smoking, and passive smoke exposure, respectively. The prevalence of current asthma was 13.2% and severe asthma was 2.4%. The association between smoking and asthma was significant and consistent among all regions of Brazil, despite climate and cultural differences. All smoking exposure types increased the odds of current asthma even after adjustment for gender, age, ethnicity, and school type. The odds of smoking exposure were higher in severe asthmatics. There was also a dose–response relationship between the number of smokers in the household and odds of reported current asthma; *i.e.*, the prevalence of current asthma significantly increased between households with 0, 1, and 2–3 smokers.

Other epidemiologic studies have found high rates of smoking in adolescents with asthma; in fact, rates are consistently equal or higher than those observed in adolescents without asthma.[11] Since smoking leads to the development of asthma symptoms, there may be an inherent selection bias. However, it is also plausible that psychosocial factors stemming from having asthma may attract some adolescents to smoking. A risk-taking behavior may be reaction to chronic illness, and peer pressure leads these individuals to attempt to enhance their self-image and fit in with their peers.[12]

The current study also reinforces that there may be no safe level of exposure to tobacco smoke, whether active or passive. Passive smoking or environmental tobacco smoke consists of the direct inhalation of tobacco smoke (secondhand smoke) as well as exposure to tobacco residue left behind after smoking (third-hand smoke). Although active smoking and secondhand smoking have been well recognized to increase the risk of exacerbations, there is increasing evidence that third-hand smoking is also associated with increased lower respiratory symptoms.[13] The dose–response relationship between smokers in the home and asthma observed in this study emphasize that some smoke exposure is bad, but more smoke exposure is worse.

Smoking not only impacts lung health through direct effects on lung function and airway remodeling, but it is also linked to an increase in the risk of respiratory tract infections. Smoke exposure has been found to increase susceptibility to pathogens by impairing macrophage function, decrease microbial clearance, and cause exaggerated proinflammatory responses to infection.[14] Thus, smoking poses a real threat to both impairment (daily symptoms) as well as risk (exacerbations) domains.

However, despite the high prevalence of smoking among adolescents with asthma and the major risks to acute and long-term health, healthcare providers frequently fall short of inquiring and counseling about smoking. Healthcare providers are generally taught to confidentially screen and counsel adolescents on risky behavior, including smoking. The good news is that adolescents with asthma are more likely to be screened and advised not to smoke by a health professional than those who do not have asthma.[13,15]

Unfortunately, specialists – who are specifically trained to treat uncontrolled asthma – are less likely to counsel adolescents on smoking than primary care practitioners.[16] This is an area specialists need to improve. Asking parents to step out of the room for a confidential encounter is not standard practice in many subspecialty clinics, however, is important not only to elicit a smoking history but also to help adolescents with the transition of care from childhood through adolescence into adulthood. Moreover, addressing smoking in the context of asthma symptoms and exacerbations may give patients additional incentives to quit.

To enhance screening, healthcare providers might consider discussing with the families about assessing tobacco smoke exposure. Cotinine is a stable metabolite of nicotine and has been widely used as a diagnostic test for tobacco use and compliance with smoking cessation. In asthma, cotinine levels have been shown to correlate with passive smoke exposure.[17] Serum and salivary cotinine levels were found to be more reliable than reported tobacco exposure for hospital readmission.[18] Cotinine levels have not been specifically used to evaluate adolescent smoking behaviors, but it may have a role in identifying environmental exposures in those with poorly controlled asthma.

Additionally, there is a lack of studies about interventions to prevent and stop smoking in adolescents with asthma. Adolescents are less likely to be driven by addiction to nicotine than adults, although they are particularly vulnerable; nicotine dependence can develop after less than 100 cigarettes.[11] A helpful screening test can be to ask how long a teen can wait after waking up to have their first cigarette – less than an hour indicates nicotine dependence.[19]

Evidence in adolescents has supported the use of similar approaches to those used in adults. Physician advice increases quit rates and has been associated with healthier attitudes about smoking in adolescents.[20] Pharmacotherapy for smoking cessation has not been well studied in adolescents with asthma, and is only generally recommended for selected individuals. Policy-based measures such as comprehensive smoke-free legislation have been extremely effective in communities, reducing the rate of asthma admissions.[21] Further development of evidence-based interventions is needed, but all adolescents with asthma need to hear from their healthcare providers that smoking will worsen their condition and that there is a risk of permanent lung damage. Furthermore, healthcare providers can help these patients to quit smoking.

Smoke exposure continues to be a significant modifiable risk factor in adolescents with asthma. Screening and counseling rates for smoking cessation are inadequate and should be conducted by all healthcare providers who manage adolescents with asthma. More work needs to be done on the prevention and treatment of smoking in adolescents with asthma, who are at increased risk for use, nicotine dependence, and poor asthma control. Even brief interventions have been beneficial; nonetheless, further studies in behavioral counseling, biomarkers, mechanisms of disease, and policy measures will guide additional strategies.

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Conflicts of interest

The authors declare no conflicts of interest.

References

1. Rasmussen F, Siersted HC, Lambrechtsen J, Hansen HS, Hansen NC. Impact of airway lability, atopy, and tobacco smoking on the development of asthma-like symptoms in asymptomatic teenagers. Chest. 2000;117:1330–5.
2. Lee JH, Haselkorn T, Borish L, Rasouliyan L, Chipps BE, Wenzel SE. Risk factors associated with persistent airflow limitation in severe or difficult-to-treat asthma: insights from the TENOR study. Chest. 2007;132:1882–9.
3. Leung R, Wong G, Lau J, Ho A, Chan JK, Choy D, et al. Prevalence of asthma and allergy in Hong Kong schoolchildren: an ISAAC study. Eur Respir J. 1997;10:354–60.
4. McCrea KA, Ensor JE, Nall K, Bleecker ER, Hasday JD. Altered cytokine regulation in the lungs of cigarette smokers. Am J Respir Crit Care Med. 1994;150:696–703.
5. Hancox RJ, Gray AR, Poulton R, Sears MR. The effect of cigarette smoking on lung function in young adults with asthma. Am J Respir Crit Care Med. 2016;194:276–84.
6. Chalmers GW, Macleod KJ, Little SA, Thomson LJ, McSharry CP, Thomson NC. Influence of cigarette smoking on inhaled corticosteroid treatment in mild asthma. Thorax. 2002;57:226–30.
7. Bateman ED, Hurd SS, Barnes PJ, Bousquet J, Drazen JM, FitzGerald JM, et al. Global strategy for asthma management and prevention: GINA executive summary. Eur Respir J. 2008;31:143–78.
8. World Health Organization (WHO). WHO global report on trends in tobacco smoking 2000–2025. Geneva: WHO; 2018.
9. Jordão EA, Kuschnir FC, Figueiredo VC, Félix MM, Silva TL, Kuschnir MC, et al. ERICA: smoking is associated with more severe asthma in Brazilian adolescents. J Pediatr (Rio J). 2019;95:538–44.
10. Asher MI, Keil U, Anderson HR, Beasley R, Crane J, Martinez F, et al. International Study of Asthma and Allergies in Childhood (ISAAC): rationale and methods. Eur Respir J. 1995;8:483–91.
11. Tyc VL, Throckmorton-Belzer L. Smoking rates and the state of smoking interventions for children and adolescents with chronic illness. Pediatrics. 2006;118:e471–87.
12. Zbikowski SM, Klesges RC, Robinson LA, Alfano CM. Risk factors for smoking among adolescents with asthma. J Adolesc Health. 2002;30:279–87.
13. Jung JW, Ju YS, Kang HR. Association between parental smoking behavior and children's respiratory morbidity: 5-year study in an urban city of South Korea. Pediatr Pulmonol. 2012;47:338–45.
14. Stämpfli MR, Anderson GP. How cigarette smoke skews immune responses to promote infection, lung disease and cancer. Nat Rev Immunol. 2009;9:377–84.
15. Jones RM, Wiseman KP, Kharitonova M. Association between high school students' cigarette smoking, asthma and related beliefs: a population-based study. BMC Public Health. 2016;16:913.
16. Thorndike AN, Ferris TG, Stafford RS, Rigotti NA. Rates of U.S. physicians counseling adolescents about smoking. J Natl Cancer Inst. 1999;91:1857–62.
17. Halterman JS, Borrelli B, Tremblay P, Conn KM, Fagnano M, Montes G, et al. Screening for environmental tobacco smoke exposure among inner-city children with asthma. Pediatrics. 2008;122:1277–83.
18. Howrylak JA, Spanier AJ, Huang B, Peake RW, Kellogg MD, Sauers H, et al. Cotinine in children admitted for asthma and readmission. Pediatrics. 2014;133:e355–62.
19. Branstetter SA, Muscat JE. Time to first cigarette and serum cotinine levels in adolescent smokers: National Health and Nutrition Examination Survey, 2007–2010. Nicotine Tob Res. 2013;15:701–7.
20. Hum AM, Robinson LA, Jackson AA, Ali KS. Physician communication regarding smoking and adolescent tobacco use. Pediatrics. 2011;127:e1368–74.
21. Been JV, Nurmatov UB, Cox B, Nawrot TS, van Schayck CP, Sheikh A. Effect of smoke-free legislation on perinatal and child health: a systematic review and meta-analysis. Lancet. 2014;383:1549–60.