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Is It Time for Aerobic Exercise to be Included in Asthma Treatment Guidelines?

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There is extensive epidemiological evidence that the rise in prevalence of asthma among children and young adults occurred between 1960 and 2000.¹ This is a period during which there were dramatic declines in physical activity related, in part, to increases in indoor entertainment and the associated improvements in housing.² The increase in asthma occurred in parallel with rises in obesity and type 2 diabetes, and there has been no doubt about the relationship between decreased physical activity and these latter 2 conditions. In children, the change in these 3 diseases was particularly obvious because each of them had previously been uncommon. In contrast, studies on the efficacy of aerobic exercise as a treatment for patients with asthma have primarily been carried out in adults.³ Exercise as a form of treatment for asthma was first described by Henry Hyde Salter in 1864. Since then many, though certainly not all studies, have shown that regular aerobic exercise can improve symptoms in patients with asthma. In addition, there is a large body of evidence related to the effect of full expansion of the lungs on bronchial tone or bronchial reactivity. Both these are consistent with the article in the current issue of the journal that has addressed the question directly by comparing the responses of adults with asthma to aerobic exercise and the effects of breathing exercises.⁴ The question we are concerned with here is whether regular aerobic exercise should be regarded as an adjunct to the pharmacological treatment of asthma or as an important part of the normal management of asthma?

The physiological effects of lung expansion have been studied for many years. Starting with the work of Nadel and Teirney⁵ in 1961, those experiments led through to the work of Skloot et al⁶ in 1995. Taken together, the results demonstrate that full expansion of bronchial smooth muscle has a potent bronchodilator effect. Indeed Fredberg et al⁷ argued that “sighs,” which are an important feature of a normal breathing pattern, have a bronchodilator effect greater than isoprenaline. Skloot et al⁶ went further to demonstrate that prolonged periods of shallow breathing can increase lung resistance in patients without evidence of asthma. These studies provide a convincing scientific basis for the beneficial effects of breathing exercises that are part of yoga-based management of asthma. The article in the current issue of the journal has addressed the question directly by comparing the responses

of adults with asthma to either aerobic exercise or the effects of Pranayama yoga-based breathing exercises.⁴ Overall, the results of the Evaristo et al⁴ study demonstrate equivalence between the 2 behavioral interventions, with both showing efficacy to improve symptoms, control, and quality of life.

A common criticism of controlled trials of behavioral interventions is that they have a relatively small number of participants. There are multiple factors that can complicate behavioral research. The obvious problem is that it is not easy to blind a study in which one aim includes physical exercise. In addition, it may be difficult to persuade patients with moderately severe asthma to undertake exercise. However, the main problem in research of this kind is the inadequate resources that are available to support behavioral research.⁸

Given the now notable evidence supporting the use of aerobic exercise and other health behavior interventions, we would like to ask the question why this issue is not addressed adequately or at all in guidelines on asthma management. As for National Asthma Education and Prevention Program Expert Panel Report 3 (NAEPP-3), one of us remembers the instructions the committee received in 2006 from the National Heart, Lung, and Blood Institute. These included “you should focus on large double-blind controlled trials published in the last 5 years.” This of course would rule out not only cromolyn or theophylline but almost all behavioral interventions. So perhaps it is not surprising that NAEPP-3 did not address the question of whether regular aerobic exercise should be recommended to all patients with asthma.⁹ Furthermore, there is no mention of exercise in the draft guidelines for Expert Panel Report 4. The Global Initiative for Asthma guidelines 2020 state “... physical activity has no benefit on lung function or asthma symptoms...,” but it quotes an article in which mean Asthma Control Questionnaire scores improved from “1.7 to 1.0,” changes that would normally be considered clinically significant (though they were not statistically significant).^{10,11} It should also be noted that the cited article studied adults without obesity in Denmark and did not provide evidence about individuals’ preintervention levels of exercise.¹¹ This is in contrast to a recent meta-analysis showing that aerobic exercise is associated with a clinically and statistically significant improvement in Asthma Control Questionnaire score.¹² Beyond efficacy is the issue of implementation. Many will argue that behavior is hard to change in clinical practice. However, a number of recent studies have led to frameworks that, if followed, will lead to better designed, implementable behavior change interventions, such as aerobic exercise.^{3,8} This kind of evidence base is needed to aid guideline developers in not only supporting aerobic exercise as a treatment but also facilitating the uptake of these interventions in practice.

If, as is clearly supported by the literature, full expansion of the lungs provides a significant decrease in bronchial resistance, it is likely that any prolonged exercise is sufficient to open the lungs enough to provide benefit. Perhaps the simple answer is that regular exercise is so important for general health that it is not worth arguing with pharmaceutical enthusiasts about its relevance to asthma, and we should simply recommend or prescribe regular aerobic exercise for all patients with asthma.

Conflicts of interest:

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REFERENCES

1. Platts-Mills TA. The allergy epidemics: 1870–2010. *J Allergy Clin Immunol* 2015;136:3–13. [PubMed: 26145982]
2. Lucas SR, Platts-Mills TA. Physical activity and exercise in asthma: relevance to etiology and treatment. *J Allergy Clin Immunol* 2005;115:928–34. [PubMed: 15867847]
3. Bacon SL, Gibson PG. Behavioral interventions for asthma: what kind of exercise and diets should we be prescribing? *J Allergy Clin Immunol Pract* 2018;6:812–3. [PubMed: 29747984]
4. Evaristo KB, Mendes FAR, Saccomani MG, Cukier A, Carvalho-Pinto RM, Rodrigues MR, et al. Effects of aerobic training versus breathing exercises on asthma control: a randomized trial. *J Allergy Clin Immunol Pract* 2020;8:2989–96. [PubMed: 32773365]
5. Nadel JA, Tierney DF. Effect of a previous deep inspiration on airway resistance in man. *J Appl Physiol* 1961;16:717–9. [PubMed: 13727342]
6. Skloot G, Permutt S, Togias A. Airway hyperresponsiveness in asthma: a problem of limited smooth muscle relaxation with inspiration. *J Clin Invest* 1995;96:2393–403. [PubMed: 7593627]
7. Fredberg JJ, Inouye DS, Mijailovich SM, Butler JP. Perturbed equilibrium of myosin binding in airway smooth muscle and its implications in bronchospasm. *Am J Respir Crit Care Med* 1999;159:959–67. [PubMed: 10051279]
8. Bacon SL, Campbell TS, Lavoie KL. Rethinking how to expand the evidence base for health behavior change in cardiovascular disease prevention. *J Am Coll Cardiol* 2020;75:2619–22. [PubMed: 32439011]
9. Urbano FL. Review of the NAEPP 2007 Expert Panel Report (EPR-3) on asthma diagnosis and treatment guidelines. *J Manag Care Pharm* 2008;14:41–9. [PubMed: 18240881]
10. Global Initiative for Asthma. Global strategy for asthma management and prevention. 2020. Available from: <http://ginasthma.org/>. Accessed June 10, 2020.
11. Toennesen LL, Meteran H, Hostrup M, Geiker NRW, Jensen CB, Porsbjerg C, et al. Effects of exercise and diet in nonobese asthma patients—a randomized controlled trial. *J Allergy Clin Immunol Pract* 2018;6:803–11. [PubMed: 29133220]
12. Hansen ESH, Pitzner-Fabricsius A, Toennesen LL, Rasmusen HK, Hostrup M, Hellsten Y, et al. Effect of aerobic exercise training on asthma in adults—a systematic review and meta-analysis. *Eur Respir J* 2020;56:2000146. [PubMed: 32350100]