

Behavioral Interventions for Asthma: What Kind of Exercise and Diets Should We Be Prescribing?



Simon L. Bacon, PhD^{a,b}, and Peter G. Gibson, MBBS, FRACP^{c,d} *Montreal, Quebec, Canada; and Newcastle, NSW, Australia*

The article by Toennesen et al¹ in this issue of the journal reports on a 2 × 2 behavioral randomized controlled trial that assessed the impact of high-intensity interval aerobic training and dietary intervention (an anti-inflammatory diet focused on increasing vegetables, fruits, nuts, lean meat, fish, and seafood) on asthma control and quality of life in adult patients with asthma. The authors reported that the combined intervention, exercise plus diet, improved both asthma control (as measured by the Asthma Control Questionnaire [ACQ]) and asthma quality of life compared with the usual care comparison group, but that airway hyperresponsiveness (AHR) and inflammation did not change. Correlational analyses indicated that improvements in control were potentially being driven by reductions in eosinophilic cell counts, which is consistent with other exercise studies,² and suggests that this may be a possible mechanism. This article adds to the growing literature in adults showing links between improved health behaviors and better asthma control, but with limited effects on AHR and inflammation.³⁻⁷ However, this study is unique in that it was conducted with a nonobese population, whereas most other studies have focused on obese or overweight populations, and included high-intensity interval training (HIIT), rather than continuous exercise that has been predominant in other studies.

The results were notable by the fact that only the combined exercise and diet group improved control (both statistically and clinically) versus the comparison group. However, it is interesting to note that the magnitude of change in this group (decrease of 0.6 in the ACQ score) was not additive or cumulative in comparison to the exercise-only (decrease of 0.4 in the ACQ score) or the diet-only (decrease of 0.4 in the ACQ score) groups. This “incremental” kind of improvement with additional health behavior-targeted interventions is consistent with other disease

areas. For example, the addition of the Dietary Approaches to Stop Hypertension (DASH) diet to a standard behavioral intervention in patients with hypertension provided only minimal improvements in blood pressure (0.6/0.9 mm Hg).⁸

Comparisons to the DASH diet, which is probably the most recognized “disease”-specific dietary pattern, are interesting in the context of the current study. In lieu of a diet that has been specifically developed for asthma, Toennesen et al used a low glycemic index diet that was supposed to be anti-inflammatory in nature, with high amounts of vegetables, fruits, nuts, lean meat, fish, and seafood (which is also somewhat consistent with the Mediterranean diet). One of the inherent complexities of conducting such dietary research is finding the optimal structure and content of the diet you wish to test. The process of intervention development is actually a growing area of research unto itself with a number of recent models and frameworks, for example, the National Institutes of Health’s Obesity-Related Behavioral Intervention Trials (ORBIT) model for behavioral treatment development and UK’s Medical Research Council guideline for developing and evaluating complex interventions, providing guidance on best practices.⁹ In the context of behavioral interventions, it is critical that we start to become more sophisticated in how we develop the intervention that we hope to test before getting to a phase III efficacy trial. One simple question that comes from the Toennesen et al¹ study would be, why 8 weeks? Given that most other studies in the field are 12 weeks long and that the authors find effects that are close to clinical significance, perhaps the extra 4 weeks is critical in reaching their goals. Formally testing an 8- versus 12-week protocol before the efficacy trial could have provided critical evidence around the potential cost and benefits of extra participant burden versus clinical changes in asthma control.

Another key methodological consideration that has been highlighted, especially with regard to the clinical utility of any behavioral intervention being tested, is that of treatment fidelity.⁹ Although Toennesen et al¹ provide some important information about who conducted the exercise portion of the trial and what instructions they were provided, there is limited information on how and if they delivered the protocol as intended.¹⁰ There is even less information provided around these issues with regard to the dietary component of the study. This issue is one that many behavioral interventionists grapple with, mostly unsuccessfully. Providing information on the qualifications of instructors, the training they were provided that was specific to the study and who delivered this, their adherence to the instruction manual, and so forth are critical bits of information that are needed to be able to replicate these interventions both in other research studies and in clinical practice.

As indicated above, one of the really unique aspects of the Toennesen et al¹ study was the inclusion of HIIT. HIIT is aerobic exercise training in which individuals alternate between

^aMontreal Behavioral Medicine Centre, CIUSSS-NIM, Hôpital du Sacré-Coeur de Montréal, Montreal, Quebec, Canada

^bDepartment of Exercise Science, Concordia University, Montreal, Quebec, Canada

^cDepartment of Respiratory and Sleep Medicine, John Hunter Hospital, Newcastle, NSW, Australia

^dHMRI, University of Newcastle, Newcastle, NSW, Australia

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Corresponding author: Simon L. Bacon, PhD, Concordia University, 7141 Sherbrooke St West, SP 165-35, Montreal, Quebec, Canada H4B 1R6. E-mail: simon.bacon@concordia.ca.

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short periods of vigorous or very vigorous intensity activity and periods of rest or lower-intensity activity, with most protocols using aerobic exercise modalities such as running or cycling for the activity. There has been a growing literature that suggests that HIIT improves a range of cardiometabolic health markers¹¹ and that it may be superior to continuous aerobic exercise (ie, constantly exercising at a moderate-intensity activity across a session).¹² That being said, there are concerns about its impact on exercise adherence, especially in patients with respiratory disease.¹³ The use of this training modality in the Toennesen et al¹ article is a first in asthma and provides us with some initial insight into its potential usage clinically. The authors found that the exercise-only intervention reduced the ACQ score by 0.4 units, compared with the comparison group, which is not far off the clinically significant average of 0.5 seen in studies of continuous exercise in adults with asthma.³ Direct comparison of these modalities would be a natural next research step, not only to explore the short-term improvements in control but also to assess the impact of the different modalities on exercise adherence. Furthermore, as with the comments around the diet intervention, using structured approaches to the development of these kinds of exercise interventions is critical. In the context of HIIT, there are still important issues around prescription that need to be explored. For example, the duration of the high-intensity portion compared with the low-intensity portion of the exercise, the actual intensity at which people should be exercised, the total length of individual sessions, the number of sessions per week, and the number of weeks to obtain optimal benefits are all poorly understood. Conducting appropriate, systematic pilot work to answer these questions increases the probability of testing the “best” intervention at the more complex and expensive efficacy trial stage.

In summary, the study by Toennesen et al¹ provides new insights into the potential beneficial role that behavioral interventions may play in the continued fight to improve asthma control in adults. From this study, a more comprehensive approach including both physical activity and dietary changes

may need to be used in adults who are not obese. Moving forward, more needs to be done on the development and optimization of the behavioral interventions that we test, so that the results of efficacy trials can be better interpreted and, ultimately, applied to clinical practice.

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