Has Aerobic Exercise Anti-inflammatory Effects for Asthma?

Rodolfo de Paula Vieira*
Post Graduate Program in Biophotonics Applied to Health Sciences, Nove de Julho University, São Paulo, SP, Brazil

One of the first studies available in the literature that can be considered as an embryonic concept of pulmonary rehabilitation (PR) was performed by Livingstone and Gillespie in 1935 [1]. In this study, the authors applied respiratory exercises to asthmatic patients, aiming to increase the chest mobility [1]. However, until the middle of 20’s century the concept of PR did not exist and the treatment was exclusively pharmacological [2].

The concept of pulmonary rehabilitation including the practice of aerobic exercise training began to emerge from the 50’s, but until few years ago, the practice of exercises by asthmatics individuals was considered as irresponsibility and strongly discouraged, because asthematics could present bronchospasm induced by exercise (BIE) [3].

On the other hand, actually, asthmatic patients are strongly encouraged to be involved in pulmonary rehabilitation programs, according to the statements of American Association of Cardiovascular & Pulmonary Rehabilitation [4,5]. This gradual change of concept represent a big advance against old paradigms, and is based in a growing number of clinical and experimental studies showing that the regular practice of aerobic exercises in appropriate volume and intensity results in several physical and psychological beneficial effects to asthmatic patients [5-15].

Compelling evidences point out to a role of aerobic exercise training in asthma physiopathology and disease control. Asthmatic patients submitted to appropriate rehabilitation program including low to moderate intensity aerobic exercise present an improvement in lung function (e.g. increase in ventilatory capacity) and asthma-related symptoms “asthma-control” (e.g. dyspnea, exercise-induced bronchospasm or peak expiratory flow variability) [5-15]. In addition a decrease of daily use of inhaled steroids has been reported, suggesting an anti-inflammatory effect of exercise on asthmatic lungs [5-15]. This hypothesis was further supported by recent findings from Gonçalves et al. and Mendes et al., demonstrating that aerobic exercise decreased the levels of exhaled nitric oxide, an established pro-inflammatory mediator in asthma, and also the number of eosinophils in induced sputum in moderate/severe persistent asthmatic patients [13,14].

In this direction, since 2004 a growing number of experimental studies using mouse models of chronic allergic airway inflammation have demonstrated that low and moderate intensity aerobic exercise performed either before, during or after the allergen sensitization results in decreased eosinophilic inflammation, Th2 cytokines production, airway remodeling and hyperresponsiveness [16-24]. Shortly, these studies have demonstrated that these beneficial effects can be attributed to decreased activation of leukocytes and bronchial epithelial cells as a result of increased activation of glucocorticoid receptors, T-regulatory cells resulting in increased synthesis of anti-inflammatory cytokine IL-10, and decreased activation of transcriptional factor NF-kB [16-24]. In addition, these studies also demonstrated that aerobic exercise present a direct inhibitory effect on the pulmonary oxidants production as well as on the synthesis of mediators involved in the airway remodeling process [19,24]. However, the precise cellular and molecular mechanisms of beneficial effects of aerobic exercise for asthma deserve further investigations.

More recently, an excellent study from Mendes et al. demonstrated for the first time that 12 weeks of moderate intensity aerobic exercise in moderate and severe asthmatic patients resulted in decreased number of eosinophils in induced sputum, proving the concept that aerobic exercise presents anti-inflammatory effects for asthma [14].

Therefore, we conclude that aerobic exercise present anti-inflammatory effects for asthma and we could affirm that a new exciting research field is now open and claiming for more investigation regarding the effects of aerobic exercise for asthma.

References


