

The Effect of Physical Exercise on the Cardiorespiratory System in Paralympic Athletes

Aleksandra Żebrowska¹, Marcin Sikora²

¹Prof. Center of Healthy Living, Academy of Physical Education Katowice, (E-mail: a.zebrowska@awf.katowice.pl)

² Department of Physiological and Medical Sciences, Academy of Physical Education Katowice, Poland

Key words. Exercise training, Paralympic athletes, cardiac remodeling, lung function, exercise tolerance.

Abstract

Background: The physical, psychological, and social benefits of participation in sports have been well documented in individuals with disability. The participation in sport may offer an innovative tool for rehabilitation, increase mobility, strength and fitness of individuals with disabilities. Paralympic participants represent a special subset of athletes. Previous studies on the frequency of abnormalities of the cardiovascular system in this group of athletes highlighted the need to intensify preventive cardiology care for athletes due to a higher prevalence of coronary heart disease. Paralympic athletes are also at high risk of an injury and respiratory dysfunction due to acute and chronic effects of strenuous exercise. It has been suggested that their aerobic performance may be limited due to reduced lung volume and respiratory muscle weakness.

Purpose: The objective of the study is to provide a detailed review of the physiological factors that determine, and thus limit, exercise performance in Paralympic athletes.

Methods: Cardiopulmonary exercise test, echocardiography, spirometry measurements were analysed in athletes who were free from any systemic pathologic conditions other than the condition causing their impairment and disability.

Results: The main finding of the study was that both male and female athletes competing in endurance disciplines attained higher peak workload. Absolute peak oxygen uptake was significantly lower in athletes with spinal cord injury compared to athletes with other disabilities. The female Paralympic athletes were characterized by the lower left ventricular dimensions, lower left ventricular mass indexed to the body surface area and lower peak oxygen uptake compared to the male athletes. With regard to sex, no differences were observed for the ejection fraction, peak heart rate, and peak blood pressure. The spirometry variables were lower in female than male athletes, however, no differences of the predicted values of respiratory variables were observed. The significant increase in peak aerobic performance in response to inspiratory muscle training and the positive effect of pulmonary rehabilitation on reducing the resistance of the central bronchi have been observed.

Conclusions: Based on the available research and scientific data, it can be concluded that physiological changes determining physical capacity depend on the type of disability and the sport discipline trained by Paralympic athletes, and cardiorespiratory system adaptations are comparable in woman and man.