



## RESEARCH ARTICLE

### INFLUENCE OF INTERVALED TRAINING OF HIGH INTENSITY IN IMPROVING BLOOD HYPERTENSION

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#### ABSTRACT

High intensity interval training HIIT is a training method that uses alternating cycles of work and rest. It has been an interesting strategy for rehabilitation and / or treatment of the cardiovascular system. HIIT is a fast and effective exercise for people who have less time and seek benefits through exercise. This study aimed to present a review study on the effect of high intensity interval training for the cardiovascular system improvement process, searching for information and results of related articles. **METHODS:** This study of literature narrative review has its data bases GOOGLE ACADEMICO, PUBMED, GOOGLE, with the objective of exposing the quality of interval training of high intensity despite being intense exercise and reflect the evidence found in the literature regarding the results of the process of improvement of the cardiovascular system. **Conclusion:** High-intensity interval training demonstrates improvements in body composition, lower blood pressure, improved aerobic capacity, increased fat oxidation capacity, and reverses metabolic syndrome risk factors that are related to high blood pressure. Descriptors: Training; Cardiovascular system; arterial hypertension; Rehabilitation; HIIT.

**Key words:** Hypertension, Interval training, Cardiovascular system.

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#### INTRODUCTION

We know today the importance of physical exercise practice in a regular, structured and supervised way, it is a constant recommendation of research, in the search for health improvements among others (RIBEIRO *et al.*, 2016). In addition to improving the quality of life of individuals, other benefits are widely discussed such as improved cardiorespiratory function, glycemic control and cardiovascular disease prevention (Domingos, 2014). The American College of Exercise Medicine guides a minimum of 150 minutes of continuous moderate aerobic exercise (EMC) per week for the development and maintenance of physical health (Thompson, Gordon and Pescatello, 2009). Studies have shown that high intensity interval training (HIIT) promotes equivalent or even superior improvements to continuous moderate intensity training in cardiovascular and respiratory functions (WESTON *et al.*, 2016). Studies have shown the benefits of using HIIT in cardiac rehabilitation programs. (Lee *et al.*, 2003; Schnohr *et al.*, 2012). Physical training is now a cornerstone along with the pharmacological treatment of patients with coronary heart disease (Ribeiro *et al.*, 2016). There is strong evidence in the literature demonstrating a contrary association between exercise intensity and risk of developing coronary artery disease (Lee *et al.*, 2003; Schnohr *et al.*, 2012).

The physiological changes that occur during and after physical exercise are broad, which makes it necessary to better understand these variables both in relation to their behavior and their applicability (DE SOUZA *et al.*, 2012), since the reorganization of these functions is essential for the elaboration of new stimuli to occur with reduced risks to health and to allow the performance gain (CASTIES *et al.*, 2006). Thus, the objective of this study was the literature review, evidencing the aspects related to the application of HIIT as a training strategy in the process of improvement of the cardiovascular system. In order to do so, some of the scientific evidence about HIIT will be addressed in order to address possible doubts, as well as facilitate and disseminate the application of this training methodology.

#### MATERIALS AND METHODS

The study consists of a review of the literature on high intensity interval training for the rehabilitation and / or treatment of the cardiovascular system. This review study was conducted through information found through the GOOGLE ACADEMIC, PUBMED, GOOGLE databases, related to the subject studied where high intensity interval training and the cardiovascular system were constant in the same. The articles found and selected were written in English and Portuguese. Key words used: Training; Cardiovascular system; arterial hypertension; Rehabilitation; HIIT. The criteria for inclusion and exclusion of the articles were assessed through the

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discussion of the theme of the influence of interval training on arterial hypertension. These articles were analyzed with the purpose of knowing the influence of the high intensity interval training in hypertensive people, with the interventions of studies that demonstrated the quality of these exercises, that could reflect the best available evidence in the literature.

## Literature Review

**High Intensity Interval Training:** Physical training is determined as systematic participation in exercise sessions. When these exercises involve intervals of work and recovery, intensity, duration, series and repetitions within a single training session, it is called interval training (GIBALA and MCGEE, 2008). Protocols and methods of High Intensity Interval Training (HIIT) have aroused the interest of the scientific community. This training method comprises in alternating periods of high-intensity aerobic exercise with periods of passive or active recovery in one intensity, and is usually practiced on cycle ergometers or motorized mats (Tjonna *et al.*, 2013). Running high-intensity protocols requires a certain level of physical fitness. HIIT should be well organized and appropriate according to the practitioner's goals, abilities and limitations, taking into account that high-intensity work has its physical, metabolic and cardiovascular risks, among others (OLSON and TABATA, 2014). The interval training protocols may present changes in the time of exercise at high intensity or in the time of recovery between the repetitions 19,20 The interval between each repetition of the exercise can be performed passively or actively, through an intensity close to 60% of VO<sub>2</sub> Max or HR<sub>max</sub> (Gibala *et al.*, 2009; Gosselin *et al.*, 2012).

One of the advantages of this training is the ability to maintain high-intensity exercise for longer periods of time compared to EMC, ensuring a higher energy consumption and greater stimulation of maximal cardiorespiratory capacity per physical exercise session (Rognmo *et al.*, 2004; Trapp and collaborators, 2008). The prescription of this training model requires the understanding of the cardiovascular metabolism and responses to different protocols with the same workload, with different types and interval durations (GOSSELIN *et al.*, 2012). Studies have demonstrated the benefits of using HIIT in cardiac rehabilitation programs. There is strong evidence in the literature demonstrating a contrary association between exercise intensity and risk of developing coronary artery disease, (Lee *et al.*, 2003; Schnohr *et al.* collaborators, 2012). A study by Schnohr *et al.* (2012) showed that the relative intensity rather than the time of exercise is more significant in preventing the development of the disease, and that male subjects who practiced physical exercise with greater intensity presented a survival rate of (Balady & Collaborators, 2007). The American Heart Association has included the interval training methodology in its recommendations for individuals with any symptoms of heart disease (Balady *et al.*, 2007). The proposition of a shorter training could represent a greater adhesion factor, applicable to the population in general. This perspective corroborates the applicability of HIIT, since this type of training can be carried out with people of different ages, lifestyles and health conditions. To exemplify this assertion, it resumes a study whose sample was composed of sedentary women with mild to moderate arterial hypertension. The main conclusions obtained show that HIIT reduced systolic blood pressure, resulting in improvement in cardiovascular health and physical performance (Mohr, *et al.*,

2014). They concluded that this type of training was feasible and could reduce the risks of obesity, cardiovascular and metabolic diseases, and it was recommended to deepen the research to confirm the preliminary data found. Patients with cardiac and metabolic diseases have presented favorable results when proposed this model in training with cycloergometer or treadmill, highlighting as safety advantages and improvements in cardiorespiratory fitness and endothelial function (Cheema, *et al.*, 2015). Ciolac *et al.* (2011), presented a study of 44 women with systemic hypertension comparing HIIT protocols and (Continuous Bite-Run Exercise EMC) at a frequency of three sessions per week with a duration of 16 weeks, reported that supervised interval training increased VO<sub>2</sub> peak values in both protocols in relation to the baseline values, however with an expressive increase in HIIT in comparison to the EMC. Another study analyzed the effects of HIIT on blood pressure and lipid profile in 245 men with moderate hypertension from the 8-week interval. there was a significant reduction in blood pressure and total and high-density lipoprotein (HDL) values, as well as a decrease in atherogenic index, and it was concluded that HIIT may be used as a non-pharmacological alternative in the treatment of hypertension (Lamina and Okoye, 2012).

## Arterial Hypertension

**Concept of Arterial Hypertension (HA):** It is a clinical condition related to several factors characterized by sustained elevation of blood pressure levels  $\geq 140$  and / or 90 mmHg. It is constantly associated with metabolic problems, functional and / or structural alterations of target organs, being aggravated by the existence of other risk factors (RF), such as dyslipidemia, abdominal obesity, glucose intolerance and diabetes mellitus (DM), (Lexington S, *et al.*, 2003; Weber MA, *et al.*, 2014).

## Arterial hypertension and cardiovascular disease in Brazil

In Brazil, artery hypertension reaches 32.5% (36 million) of adult individuals, over 60% of the elderly, collaborating directly or indirectly for 50% of cardiovascular disease deaths (Scala LC, Magalhães LB, Machado A, 2015). In 2013 there were 1,138,670 deaths, 339,672 of which (29.8%) resulting from cardiovascular disease, the main reason for death in the country. Mortality rates have been declining over the years, with the exception of hypertensive diseases (HD), which increased between 2002 and 2009 and presented a tendency to decrease since 2010. The rates of hypertensive diseases in the period varied from 39 / 100,000 inhabitants (2000) to 42 / 100,000 inhabitants, (Guimarães, *et al.*, 2015). The prevalence of arthralgia hypertension in Brazil varies according to the population and the method of evaluation. In the meta-analysis of (Picon *et al.*, 2012) the 40 cross-sectional and cut studies included showed a tendency to decrease the predominance in the last three decades, from 36.1% to 31.0%. A study with 15,103 public servants from six Brazilian capitals observed a predominance of hypertension in 35.8%, with predominance among men (40.1% vs 32.2%), (Chor D, *et al.*, 2015). The advancement of a physical training program can contribute to the reduction of the risk factors for arterial hypertension, since many types of training can be developed, helping to avoid sedentary lifestyle and thus reduce rates of excess weight, without imposing large monetary resources. To prove the benefits provided by physical exercise, we analyze data that demonstrate the idea that regular exercise decreases

cardiometabolic risk. Thus, the set of modifiable risk factors present in individuals and that may predispose to the appearance of cardiovascular diseases, despite the interference of a good diet (Kessler, H. S.; Sisson S. B., Short K. R. 2012). Another finding is attributed to the fact that regular aerobic exercises also improve cardiovascular capacity. (GÓES, 2017) Rehabilitation programs formed by elements of moderate regular physical training are considered safe and improve the prognosis of individuals with heart disease. Improvements were found in the pulmonary, cardiovascular and musculoskeletal systems, resistance, quality of life, inflammation, symptoms of depression, stress and cognitive functions in frequent physical exercise practitioners and physically active individuals. HIIT provoked a strong clinical interest in hypertensive patients, when it was cited in 2007 by the American Heart Association recommendations for exercise prescription (Ribeiro *et al.*, 2016).

## Conclusion

We conclude with the work reference that the HIIT training method is the best option for people with arterial hypertension, taking into consideration that the interval training of high intensity has a shorter duration and greater effectiveness on the cardiovascular and cardiorespiratory system, very attractive so that anyone even those who have little time to exercise, can do a physical exercise that will contribute positively to its improvement in the framework of arterial hypertension and quality of life.

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