

Exercise in Patients with Essential Hypertension: Current Concepts

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Essential hypertension represents a major public health problem leading to over 7 million deaths annually [1], as blood pressure (BP) levels are directly associated with vascular and overall mortality [2]. Accumulating data point towards a beneficial role of lifestyle changes, including increased physical activity, in promoting traditional cardiovascular risk factors' control (i.e. obesity, dyslipidemia, diabetes mellitus and hypertension). The importance of physical activity in essential hypertension is better understood taking into consideration that obesity, dyslipidemia and diabetes mellitus are common in hypertensive patients.

In 1953, Morris et al. [3] provided the first piece of evidence suggesting an association between fitness status and morbidity/mortality with their study on drivers and conductors of London's double-decker buses. Since then, well-designed epidemiological studies have confirmed the beneficial effects of adequate exercise on cardiovascular and all-cause mortality in healthy middle-aged [4-8] and older [9-11] men and women. Aerobic exercise exerts its beneficial effects on the cardiovascular system by promoting traditional cardiovascular risk factors' regulation (such as obesity, diabetes, dyslipidemia and hypertension). In terms of underlying pathophysiology, aerobic exercise seems to favorably regulate sympathetic nervous system (SNS) activity, inflammatory response, cardiac and vascular function (both arterial stiffness and endothelial dysfunction) [12].

Interestingly, the beneficial effects of exercise in cardiovascular health depend largely upon exercise type (strength or resistance vs. endurance exercise), frequency, duration and intensity. The reluctance towards resistance exercise tends to be replaced by an overwhelming number of studies and recent meta-analyses [13,14] showing its beneficial role, especially in combination with aerobic exercise analysis. However, additional studies are needed in order to further clarify its effects on cardiovascular risk management.

Despite the beneficial effects of regular physical activity on the cardiovascular system, acute physical activity has been implicated in triggering of acute cardiac events. In accordance with the aforementioned results, a recent meta-analysis of 14 studies showed a significant association of episodic physical and sexual activity with acute cardiac events (myocardial infarction / MI, sudden cardiac death / SCD and acute coronary syndrome) [15]. This association was observed even in individuals with high levels of regular physical activity, although the relative risk for MI and SCD reduced by 45% and 30% respectively, for each additional exercise session a week. Acute cardiac events are characterized by a circadian occurrence with a morning excess. This morning excess of acute cardiac events has been associated with the physiological morning rise of several neuroendocrine and hematologic factors [16]. The physiological morning response provides a pathophysiological link between acute cardiac events and dynamic exercise, through several common aspects (i.e. SNS activation, changes in coagulation and fibrinolysis and platelet activation).

In conclusion, cardiovascular effects of exercise in patients with essential hypertension have been thoroughly investigated by a number of experimental and clinical studies. In order to fully interpret this knowledge into clinical practice, we need to better understand the role of exercise intensity and duration on triggering or inhibiting this harmful pathophysiological cascade. Furthermore, of great importance

is to elucidate optimal exercise training type, duration and intensity in special populations, such as older adults or patients with high cardiovascular risk.

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