SHORT COMMUNICATION

Exercise for Cardiovascular Disease Prevention and Treatment: Prognoses, Mechanisms, and Approaches

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INTRODUCTION

CVD is a group of heart and blood vessel disorders that include stroke, heart failure, hypertension, coronary artery disease, cardiac arrhythmia, peripheral artery disease, and atherosclerosis [1]. Individuals with CVD are reported to have high blood pressure, high glucose levels, smoking, and obesity, a lack of exercise, excessive alcohol use, and dyslipidaemia. Fortunately, CVD may be effectively treated and avoided by managing blood pressure, glucose, lipids, smoking, and alcohol use, as well as making lifestyle changes for sleep, emotion, exercise, and nutrition, known as SEED intervention [2]. With the world's population ageing, CVD has overtaken cancer as the top cause of mortality. CVD caused approximately 17.9 million deaths worldwide in 2015 [3]. The proportion of Chinese people aged 60 and up grew to 16% in 2015, implying that cardiovascular disease is now the major cause of mortality in China [4]. Obesity, high blood pressure, diabetes, age, male sex, metabolic syndrome, and physical inactivity are all risk factors for CVD. Obesity is defined as having a body mass index (BMI) more than 30, while overweight is defined as having a BMI greater than 25. Obesity prevalence has surpassed 50% in most countries and has been growing in both adults and children over the last few decades [5]. Obesity has been shown to increase blood volume, CRP, and TNF, all of which lead to heart remodeling and inflammation. Obesity also increases the risk of CVD risk factors such as high blood pressure, stroke, myocardial infarction (MI), and insulin resistance [6]. Furthermore, CVD mortality and morbidity have been demonstrated to be rising in overweight populations, particularly those with abdominal obesity [7]. Type 2 diabetes, the most prevalent type of diabetes, is a chronic metabolic condition characterized by high blood glucose and inadequate insulin sensitivity. Diabetes is becoming more common, and the number of individuals diagnosed with the condition has increased from 30 million in 1985 to 382 million in 2014, with experts predicting that by 2035, 592 million people will have diabetes, accounting for about one in every ten people [8]. This disease not only affects the elderly, but it is now affecting a growing number of young individuals and even children [9]. Numerous research and evidences show that type 2 diabetes is an independent risk factor for CVD. Patients with type 2 diabetes have a poorer prognosis and treatment effects of CVD than those who do not have diabetes. Adult CVD mortality rates in the United States are 1.7 times greater in diabetics than in non-diabetics [10]. The vast majority of type 2 diabetes medical care costs are attributed to vascular problems such as MI, hypertension, peripheral vascular disease, and coronary artery disease [11].

Many compelling evidences support exercise's therapeutic and preventive benefits on the body, including improved insulin sensitivity in diabetic mice and reduced sympathetic activity, arterial pressure, and heart rate in spontaneously hypertensive rats [12]. Exercise training increases mitochondrial biogenic response, electron transport chain components, mtDNA, and associated lipid metabolic pathways [13]. In this section, we will discuss the advantages of exercise on cardiovascular disease from the following perspectives.

In 2015, the European Society of Cardiology advised that cardiac rehabilitation programmes give exercise Oxidative Medicine and Cellular Longevity 5 training to patients with non-ST elevation acute coronary syndrome since it is a low-cost, low-risk, and non-drug intervention [14]. Physical activity is a necessary component of everyone's life. However, the degree of exercise varies across persons depending on their physical state [15]. Although several studies demonstrate a beneficial relationship between exercise and good health, a complete medical examination is required prior to beginning an intensive exercise training programme. The intensity, method, duration, and frequency of exercise can all have a significant impact on the outcome.

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Aerobic exercise is defined as the use of aerobic metabolism to obtain energy from muscles, and it mostly refers to low- to moderate-intensity physical activities. Aerobic exercise, as previously stated, has beneficial benefits on lipid metabolism, cardiac remodeling, post-MI heart failure, insulin resistance, and endothelial function. Anaerobic exercise is defined as any action that generates energy without the use of oxygen, instead of relying on glycolysis and fermentation. High-intensity training, such as sprinting and power lifting, is commonly referred to as anaerobic exercise. High-intensity exercise has been advised in numerous studies to reduce TG and LDL. Anaerobic exercise, like aerobic exercise, has a beneficial effect on body mass index and blood pressure [16]. In certain situations, high-intensity exercise is more helpful to the cardiovascular system and EDR than low-intensity exercise [17]. The benefits of high-intensity intermittent exercise include the fact that it may be done in as few as 3-4 sessions per week and achieve considerable results [18]. However, there is a paradox of drawbacks to anaerobic exercise training in that high-intensity activity causes increased mortality and abrupt death. A widely held belief is that acute intense exercise increases the risk of cardiovascular diseases, such as MI, by raising blood pressure [19].

In certain situations, high-intensity exercise is more helpful to the cardiovascular system and EDR than low-intensity exercise. The benefits of high-intensity intermittent exercise include the fact that it may be done in as few as 3-4 sessions per week and achieve considerable results [18]. However, there is a paradox of drawbacks to anaerobic exercise training in that high-intensity activity causes increased mortality and abrupt death. A widely held belief is that acute intense exercise increases the risk of cardiovascular disease, such as MI, by raising blood pressure [19].

When it comes to fitness, many individuals are taken advantage of by the all-or-nothing mentality. However, if you begin to alter, the low-intensity workout regimen may assist you. Even the simplest action is preferable than doing nothing, and it is never too late to begin. When used to real-world patient care, exercise training has several limitations. Existing research does not give precise recommendations on the various intensities, durations, and frequencies of exercise that may be appropriate for various types of illnesses. Personalization of exercise will be an unstoppable trend in the future. Although we know that exercise protects against CVD by lowering sympathetic activity, arterial pressure, and heart rate, increasing blood flow and endothelial NO production, causing vessel dilation, and decreasing inflammatory cytokine and reactive oxygen species formation, the exact mechanisms that lead to transcriptional factor changes or transcriptional modifications are unknown. As a result, future research may focus on the mechanisms of exercise's protective benefits on the heart and arteries.

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