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INVESTIGATING THE INFLUENCE OF GENETIC PREDISPOSITIONS ON CARDIOVASCULAR DISEASE RISK AND EXPLORING POTENTIAL GENE-BASED THERAPEUTIC INTERVENTIONS

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ABSTRACT:

Introduction: Cardiovascular diseases (CVD) are a significant public health concern worldwide, necessitating effective prevention and management strategies. Lifestyle interventions play a crucial role in mitigating CVD risk factors, yet their efficacy and feasibility warrant further investigation.

Objective: This study aims to evaluate the effectiveness and feasibility of lifestyle interventions, including diet modification, exercise regimens, and stress management techniques, in both managing and preventing cardiovascular diseases.

Methods: A comprehensive review of existing literature was conducted to examine the impact of lifestyle interventions on CVD prevention and management. Relevant studies were identified through electronic databases, and data extraction and synthesis were performed to assess the efficacy and feasibility of various lifestyle interventions.

Results: The review highlighted the importance of lifestyle interventions in reducing CVD risk factors and improving overall cardiovascular health. Effective strategies included dietary modifications, regular exercise, and stress management techniques, which demonstrated significant benefits in both preventing and managing cardiovascular diseases.

Conclusion: Lifestyle interventions, encompassing dietary modifications, exercise regimens, and stress management techniques, are vital components of comprehensive cardiovascular disease

prevention and management strategies. Further research is needed to optimize the implementation and scalability of these interventions for broader public health impact.

KEYWORDS: Physical Exercises; Elderly People; Cardiovascular Diseases.

INTRODUCTION:

In recent years, the elderly population has increased more and more. The search by this population for a lifestyle that guarantees an increase in longevity and quality of life has also increased, as well as the search for the prevention and treatment of chronic diseases non-communicable diseases (NCDs) through adherence to healthy lifestyle habits, which include Physical Exercise (PE) as a fundamental aspect (Chair et al., 2024; Nelson, Pagidipati, & Bosworth, 2024).

Among the most common non-communicable diseases, cardiovascular diseases are widespread in society, especially among the elderly, as well as being the leading cause of mortality in the world. The performance of moderate to intense PE is associated with significant reductions in the incidence of cardiovascular events. In this context, the practice of PE is an essential ally in preventing and prognosis of these pathologies (Trolle Lagerros, Grotta, Freyland, Grannas, & Andersson, 2024).

The aging of the population is a global trend that also affects the Brazilian population: it is estimated that in 2030, the Brazilian population will increase by 11 million people over 60. This audience is increasingly concerned about improving their quality of life, but a large portion of this population has some type of comorbidity, including cardiovascular disease. Prescribing exercises for patients with cardiovascular disease still generates many doubts among physical education professionals about which methods to use and how to adapt exercises to each student's limitations (Aburadwan & Hayajneh, 2024; ДВВВВВВ & ЇВВВЛВЇ, 2025).

In consideration of this, this work aims to analyze, through already published studies, how physical exercise can promote improvements in the pathological condition of people with cardiovascular diseases, highlighting better methodologies to work with the elderly population with comorbidities in the prescription of drugs and physical exercises, address how the introduction of physical exercise can bring improvements in sedentary people and people with cardiovascular diseases (Kayhan & Nural, 2024; Li et al., 2024).

Cardiovascular Disease:

In recent years, the elderly population has grown in Brazil; for example, in 1980, for every thousand inhabitants who turned 60, only 344 managed to reach 80 years of age; in 2019, this number rose to 604, and the life expectancy of Brazilians has increased to 76.6 years. If in the last century the primary diseases that affected the population were infectious due to environmental issues and the lack of essential sanitation services, currently they are chronic non-communicable diseases (NCDs) that most affect the population, causing a high number of deaths and economic and social losses, non-communicable diseases represent one of the main concerns in the healthcare sector today (Bhat & Balakrishnan, 2024; Hartanto, Kasturiratna, Hu, Diong, & Lua, 2024).

With development have come many improvements for the population that have made daily life easier, such as the development of machines and equipment that guarantee more comfort and reduce fatigue at work and technological advances in the medical field. The increase in non-communicable diseases reflects the adverse effects of globalization, of changes in eating habits such as the consumption of ultra-processed foods, which guarantee more convenience but are poorly nutritious and represent a health risk, a lifestyle sedentary which increases the risk of mortality by 20% to 30% (Willis et al., 2024).

Cardiovascular diseases (CVD) are a group of non-communicable diseases and refer to all types of diseases that affect the heart. They are the leading cause of morbidity and mortality in developed and developing countries. Significant types of heart disease include hypertension, coronary heart disease, cardiac arrhythmia, and even more severe conditions such as cardiac arrest or even a stroke. Cardiac arrests and cerebrovascular accidents (CVA) are acute events caused by a blockage that prevents

blood from flowing to the heart or brain. The leading cause is the formation of fatty plaques on the internal walls of the blood vessels that supply the heart or brain (Gray, Vogel, Mehran, Leopold, & Figtree, 2024; C.-W. Wang et al., 2024).
Strokes can also be caused by bleeding blood vessels in the brain or the formation of blood clots. The leading causes of cardiac arrest and stroke are linked to a combination of risk factors such as tobacco use, inadequate diet and obesity, sedentary lifestyle and harmful use of alcohol, hypertension, diabetes and hyperlipidemia (Clayton-Chubb et al., 2024).

Importance Of Physical Exercise For Heart Patients:
Physical activity has long been discouraged for heart patients to avoid overloading the heart; however, not doing physical exercise makes this organ less resistant. During PE, there is a more significant overload on the heart. Therefore, the prescription of physical exercises for this audience must be carried out individually, adapting to the needs and limitations of each patient. An exercise prescription is carried out through cardiovascular risk stratification based on clinical history, echocardiogram, cardiological physical examination, and electrocardiogram and exercise tests. Through stratification, it is possible to determine which exercise is most appropriate and the ideal intensity for each person, aiming for cardiovascular rehabilitation (Epping, Tetzlaff, Mond, & Tetzlaff, 2024; Sidik et al., 2024).
The development of physical activities for cardiovascular rehabilitation aims to improve the quality of life, prevent cardiovascular accidents and reduce the risk of mortality. Physical training must be carried out by a physical education professional to monitor the execution of the exercises, guide the correct way to perform them, observe and correct the patient's execution, and thus avoid the risks deriving from an incorrect execution. Monitored exercise promotes central and systemic adaptations that can improve heart rate, blood pressure, and cardiac output and trigger improvements in cardiorespiratory fitness in these individuals, thus providing a better quality of life (Ladouceur & Bouchardy, 2024).
The development of EF in chronic form favours a series of morphological and functional adaptations which will favour a better response capacity of the organism to the same stress, so when faced with the same exercise with the same intensity, the organism will favour a lower post-acute response to exercise, better control and distribution of blood flow and specific adaptations of skeletal muscles (Huck et al., 2024; Sohier, Dallaire-Habel, Turcotte, & Foldes-Busque, 2024).

Benefits Of Performing Physical Exercises For Elderly People With Cardiovascular Problems:
The regular performance of physical exercises promotes physiological adaptations such as increased strength and cardiovascular resistance, which can be developed through combined training (CT), characterized by the association of two or more training sessions. A study conducted by Rocha et al. on sedentary women over the age of 60 who did not use drugs that interfered with bone and cardiovascular metabolism was applied in the TC group integrated by the variables muscular strength and cardiovascular resistance, observing improvements in the functional capacity of the population studied as well as a reduction in falls (Ebrahimi et al., 2024; Kovacs et al., 2024).
Santiago observed the effects of detraining on cardiovascular parameters in elderly women aged between 60 and 70 years; the study lasted eight weeks, and a worsening of parameters relating to cardiovascular risks such as the average increase in the waist-hip ratio was observed (WHR) compared to with the exercise routine was 0.81±0.02 and increased to 0.83±0.02, the average increase in total cholesterol with values of 152.40±11.98 increased to 196.40±14.63 and the percentage of weight loss increased to 28.20±1.86 from 26.04±1.38 (Boughdady, Ghazi, Elmawla, Abd Elhameed, & Ali, 2024).
Cassiano et al. carried out a study with elderly and hypertensive people for a total of 48 participants who underwent a mixed protocol of physical exercises lasting 16 weeks and observed a reduction in systolic and diastolic blood pressure values and waist circumference (Khadanga et al., 2024).

Types Of Training Applied To Elderly People With Cardiovascular Problems:
Resistance training (RT) has been used to improve the physical capacity of individuals with non-communicable diseases. Several health organizations recommend it to prevent and rehabilitate adults and older adults with non-communicable diseases. This type of training is primarily aimed at increasing strength and localized muscular endurance (Herrmann et al., 2024).
RT promotes numerous benefits in different age groups, especially in the elderly. For the elderly, bodybuilding promotes numerous benefits, including blood pressure control. It is necessary to start by exercising the larger muscle groups and then the small ones; they must be performed in sets of 8 to 10 and with a frequency of at least 2 or 3 times a week (Bumrungsuk, 2025).
Repetitions can range from 8 to 12 for adults, and frailer older people should do 10 to 15 repetitions. The number of repetitions should be adapted according to each individual's needs and limitations. Another essential precaution is to check blood pressure before and during exercise and carry out individual assessments, carefully observing, among other things, the addition of weight during exercises (Sacher et al., 2024; Zhang et al., 2024).

Combined training is also used in the elderly and the elderly population, characterized by the association of strength exercises and aerobic exercises in a training session, which, if carried out appropriately, promotes improvements in muscle function and structure and is related to improvements in clinical conditions such as cardiovascular diseases (Bogoian et al., 2024).

Santos carried out a systematic review of the studies that associated the trend of SBP and DBP values, and all the studies demonstrated that after carrying out combined training, there were significant reductions in SBP and DBP values (Khedr, Ali, Sanhoury, & Hussein, 2024; Walaszek, 2024).

CT and TR are methodologies that offer physiological adaptations, mainly for the elderly. The effectiveness of using this method in reducing cardiovascular risk and improving the clinical condition of heart patients is demonstrated by studies (Sheela & Krishnamurthy, 2024).

METHODOLOGY:

This study is a narrative bibliographic research, using already published materials, such as books, documentaries and scientific articles, as a research source (Joglar et al., 2024).

To answer the guiding question "How to adapt exercise prescription for older adults with cardiovascular disease?" a search was carried out in texts published in books, scientific articles published in databases such as Science Direct, SciELO and PubMed in Portuguese and English, from July to October 2022. Using as a strategy the terms of the Scientific Descriptors of Health (DeCS) where the following keywords were used for the search: physical exercise, elderly and cardiovascular diseases (Benetos, 2024; Christogianni, 2025; Zhao et al., 2024).

The inclusion criteria for selecting the analyzed articles were: original article, complete summary in the database, in Portuguese and English, between 2017 and 2022, to work with more recent studies on the proposed topic. Articles that did not address the topic of exercise prescription for older adults with cardiovascular disease or that did not meet the inclusion criteria were excluded (Manning et al., 2024; H. Wang et al., 2024).

Of the sources searched, 161 articles were found in Science Direct, 2 in SciELO, and 5 in PubMed for 168 studies. The full texts were analyzed and used in the review. An explanation of the article selection is shown in Figure 1 (Montano, Oursler, & Marconi, 2024; Zhao et al., 2024).

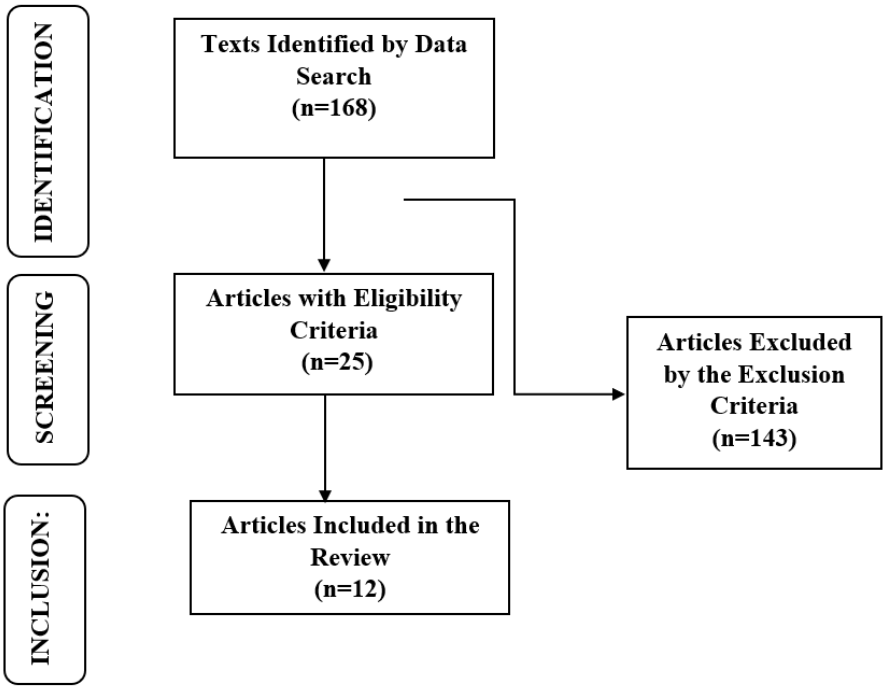

Figure 1 – Search and selection strategy

CONCLUSION:

In light of the results, it is concluded that physical exercise is essential to guarantee the quality of life of the elderly, especially those suffering from non-communicable diseases. Physical training is associated with increased strength, cardiovascular resistance, improved function, reduction of falls, and reduced cholesterol levels and fat percentages.

Combined training, as well as resistance training, has proven to be effective and safe methods to use in patients with cardiovascular problems.

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