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The Role of Exercise Therapy in the Prevention and Treatment of Degenerative Hypertension: Literature Review

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ABSTRACT: Human growth and development can be seen from fine and gross motor skills, cognitive abilities, and the maturity of cells in the body. A person's growth and development will reach the peak phase. People have differences regarding the factors of decline (degeneration) they experience. The process of decline can increase a person's risk of developing various diseases. Hypertension cases make this disease a contributor to the highest risk of death. Hypertension cases caused by lifestyle can be prevented or treated by exercising as a protector and treating hypertension cases. Hypertension cases caused by lifestyle can be prevented or treated by exercising as a protector and treating hypertension cases. This research method used a literature review search from 2018 to 2023 resulting in 556 articles which were selected into 5 articles according to research criteria. Research results of physical activity for 150 minutes/week with moderate intensity or 75 minutes/week with high intensity to improve the quality of fitness and public health. Combining aerobic exercise with weight training at least 2 times/week, with regular physical activity will increase a person's life expectancy, especially in the prevention and treatment of hypertension.

KEYWORDS: Hypertension, Exercise Therapy, Physical Activity

I. INTRODUCTION

Living creatures are creatures that develop and grow. Humans are perfect living creatures. Human growth and development indicates increasing age. Human growth and development can be seen from fine and gross motor skills, cognitive abilities, and the maturity of cells in the body (Fallo, 2013) . A person's growth and development will reach the peak phase. People have differences regarding the factors of decline (degeneration) they experience. The process of decline can increase a person's risk of developing various diseases.

Degenerative diseases are a collection of types of diseases that occur due to the inability of internal organs to work normally due to the deterioration of cells in a person's body during the aging process (Santoso et al., 2021) . The aging process or decline in cell function on average is experienced by a person when they reach the age of 40 years and over (Kesetyaningsih et al., 2020) , with various kinds of disease complaints that often occur such as hypertension, diabetes mellitus, stroke, heart disease, which is usually called the dangerous circle of death. which are interconnected (Ministry of Health, 2022) .

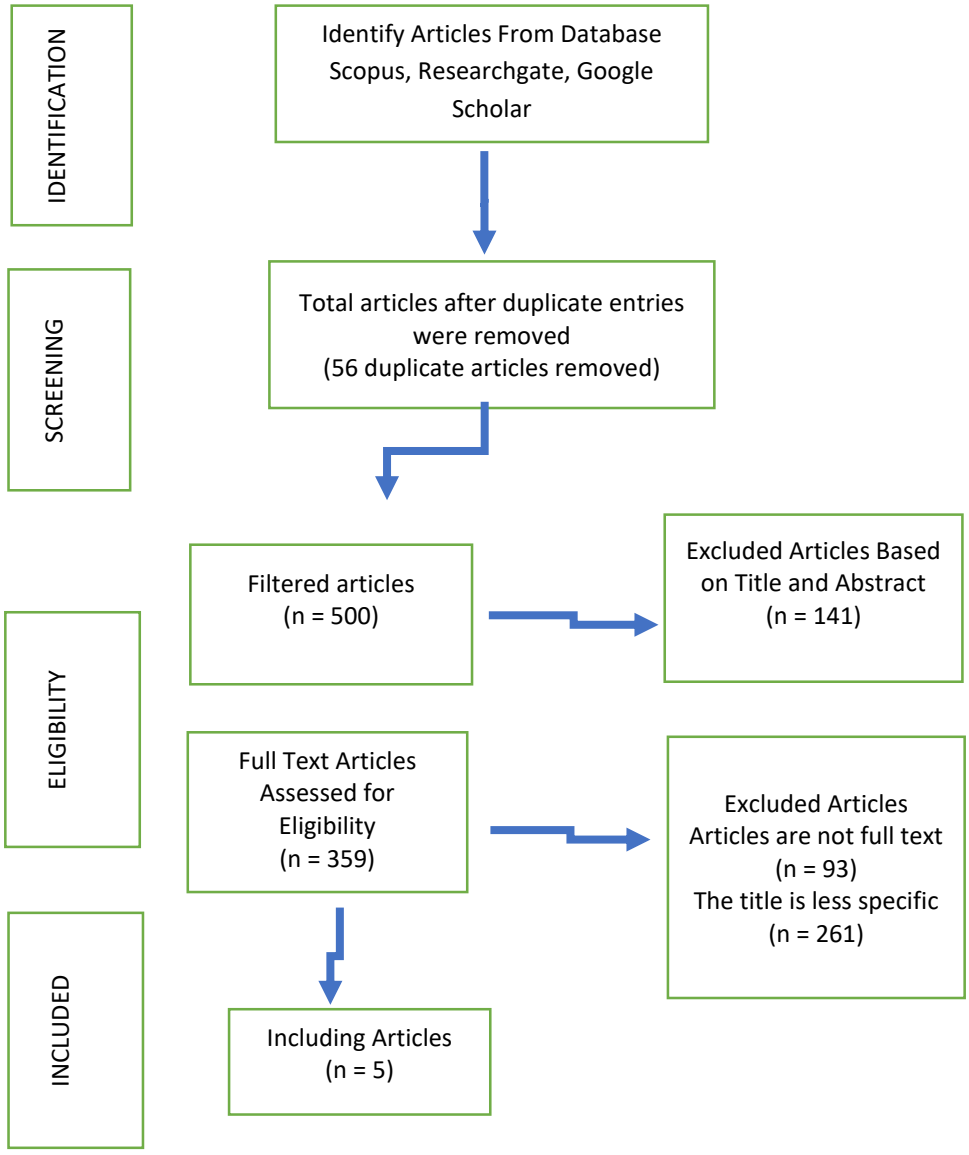
In this modern era, many people suffer from degenerative diseases during their productive years. The main factors are sedentary daily activity, body food intake, and lifestyle (Renzo et al., 2021) . The average productive age person experiences degenerative disease in the form of hypertension, due to stress, poor diet and sleep patterns, this is supported by research (Kasumayanti et al., 2021) that 36 research samples out of 104 samples experienced hypertension at the age of 20-45 years, with the level of stress and unhealthy lifestyle carried out by the sample. Hypertension is a disease where the blood pressure in the body is ≥140 mmHg systolic and ≥90 mmHg diastolic. The prevalence of hypertension worldwide is around 1.28 billion in adults, with 46% of people unaware they have hypertension, 42% of people with hypertension are diagnosed and treated, and 1 in 5 people (21%) can control hypertension (WHO, 2023) . Riskesdas in 2018, the prevalence of hypertension in Indonesia was 34.11%, the estimated number of hypertension cases in Indonesia was 63,309,620 people, while the death rate in Indonesia due to hypertension was 427,218 deaths.

The large number of cases of hypertension makes this disease a contributor to the highest risk of death, so it is necessary to implement preventive or rehabilitative processes. Preventive is a way to prevent disease from entering the body in various ways, while rehabilitative is a way to carry out healing treatment which can be done pharmacologically or non-pharmacologically.

Pharmacological treatment is the provision of therapy using drugs to lower or regulate blood pressure, while management which is included in non-pharmacological therapy is by modifying lifestyle including hypertension diet, physical activity, stress management, patient compliance with regular blood pressure control (Machus et al., 2020) . This article examines in more depth the role of exercise in preventing and treating hypertension.

II. METHOD

Qualitative research with *literature review studies* uses various literature studies to strengthen research analysis with secondary data. Secondary data is taken indirectly to provide information to the author. Data sources can be reports, articles from accredited and indexed journals related to *exercise therapy* in *hypertensive patients.* There are four stages in PRISMA: the first stage, identifying selected articles, must meet the requirements, such as articles published from 2018 to 2023; The second stage was screening 556 articles obtained from Scopus, Google Scholar, and Researchgate which were then evaluated, and the selected articles were assessed for their relevance. The third stage is the feasibility of the article, analysis and evaluation of its feasibility. Evaluation of the importance of articles at the eligibility stage was assessed based on the title and abstract carried out by two independent reviewers. The fourth stage is explanation of the results. Articles that meet the exclusion criteria will be removed. The fourth stage is the inclusion of screening results under the criteria. The article search technique uses keywords in Scopus in the form of *"exercise therapy", "Hypertension"* .



At the filtering stage, the identification results of 556 articles obtained from Scopus, Google Scholar, and Researchgate were evaluated to identify duplicates or articles that indicated the same content. Next, at the suitability stage, the article is analyzed and assessed for suitability, with a focus on the title and abstract by two independent reviewers. Articles that met the inclusion criteria were then reviewed in detail as a whole. Based on the PRISMA Stage, 5 articles met the inclusion criteria, and

these 5 articles were reviewed in this study. A detailed summary of the PRISMA process can be seen in Figure 1. Based on the systematic review process, 5 articles were selected that met the criteria for the Role of Exercise in the Prevention and Treatment of Degenerative Hypertension.

III. RESULTS AND DISCUSSION

A. RESULTS

The results of the search for articles in the literature review showed that there were six articles filtered according to research criteria, based on the title and abstract with a description of the six articles which can be seen in table 1.

Table 1Literature review

No.	Author	Title	Methods	Sample	Results
1	(Gorostegi-Anduaga et al., 2018)	Effects On Cardiovascular Risk Scores And Vascular Age After Aerobics Exercise And Nutritional Intervention In Sedentary And Overweight/ Obese Adults With Primary Hypertension: The EXERDIET -HTA Randomized Trial Study	CVR and VA were determined (n=167, 53.7±7.8 years) using the Framingham Risk Score (FRS) and the new equation for prediction of 10-year atherosclerotic cardiovascular disease (ASCVD) risk, before and after the 16-week intervention period (program different aerobic exercises+hypocaloric diet). Sex-specific risk factors considered were age, high-density lipoprotein cholesterol (HDL-C), total cholesterol, systolic blood pressure (SBP), diabetes mellitus (DM) and smoking status.	108 men and n=59 women	From baseline to follow-up, participants reduced (p≤0.001) FRS-CVR and VA scores, and SBP. Total cholesterol decreased significantly, but specifically in men (p≤0.001), and antihypertensive drugs (%) in women (p=0.047). No significant differences over time were observed for HDL-C, smoking, DM overall for both sexes. For ASCVD-CVR there were no changes overall or for both sexes. After intervention, women had lower CVR scores than men (p≤0.001). of calculation methods Improvements in CVR factors after a 16-week lifestyle change intervention reduced the risk of suffering a CV event in the following 10 years in overweight/obese adults with HTN assessed with the FRS estimation tool.
2	(Smart et al., 2019)	An evidence based analysis of managing hypertension with isometric resistance exercise—are the guidelines current?	meta-analyses	Twelve studies provided data on 326 participants.	Our recent IPD meta-analysis showed that IRT (three times a week with a total of 8 minutes of squeezing activity) was able to reduce participants' SBP by 6-7 mmHg. Similar levels of blood pressure reduction resulting from prescription drug use have been shown to equate to a 13% reduction in the risk of myocardial infarction and a 22% reduction in the risk of stroke.
3	(Atef & Abdeen, 2021)	Effect of exercise on sleep and cardiopulmonary parameters in patients with	randomized into two equal groups. training group (A) and control group (B).	30 samples	Sleep scores and RVSP showed a significant decrease and VO2max—which represents aerobic fitness showed a significant increase in group (A) compared with group (B)

		pulmonary artery hypertension			
4	(Yasu, 2022)	Comprehensive cardiac rehabilitation program for peripheral arterial diseases	The most useful screening method for PAD is the ankle brachial pressure index (ABI).	25 samples	Exercise therapy is contraindicated in patients with acute arterial occlusion and CLI with infection. PAD is often associated with other atherosclerotic diseases; patients should be monitored for ischemic heart disease during an initial exercise stress test using the Gardner treadmill protocol. Supervised exercise therapy is strongly recommended (Class I, Level of Evidence A). As an alternative, a home exercise program is also feasible (Class IIa, Level of Evidence A). Exercise type (treadmill, track walk, ergometer), frequency (3 to 5 days per week), intensity (speed and incline), and duration (30 minutes) were determined based on the results of an exercise stress test for each patient. Exercise should be continued at least 3 times a week for a minimum of 12 weeks. Cilostazol is highly recommended (Class I, Level of Evidence A)
5	(Trillaud et al., 2023)	Tracking Biomarker Responses to Exercise in Hypertension	systematic approaches and randomized controlled trials in larger cohorts	22 samples	Emerging data suggest that improved aerobic fitness and vascular function as well as reduced oxidative stress, inflammation, and gluco-lipid toxicity are key biomarkers thought to trigger hypertension, but they only explain about half of its pathophysiology. New biomarkers such as EVs or microRNAs provide additional insights to understand the complex mechanisms involved in exercise therapy for HTN patients

B. DISCUSSION

The results of the five articles show the role of exercise applied to hypertension sufferers, by including exercise as part of lifestyle changes. An appropriate and regular exercise program supported by other healthy living activities such as smoking cessation, stress management and sleep management, reduces the risk of developing primary hypertension. Apart from lowering blood pressure and reducing body weight, exercise also plays a role in the betablocker system in a person's body. A person's awareness of the role of sport influences the number of cases that occur in Indonesia.

The prevalence in Indonesia of hypertension reaches 28% and the Special Region of Yogyakarta occupies the third position in Indonesia (Sudarsono et al., 2017) . Hypertension is a problem that occurs in the cardiovascular system. Hypertension is characterized by systolic blood pressure ≥140 mmHg and diastolic ≥90 mmHg which can be caused by lifestyle and genetic factors (Mills et al., 2020) .

Hypertension is referred to as a silent killer, divided into two, namely primary (essential) hypertension and secondary hypertension. Primary hypertension is an increase in blood pressure for which there is no known cause. Cases of primary hypertension are often found in the community because 90% have primary hypertension. Secondary hypertension is an increase in blood pressure due to certain medical conditions such as kidney disease, parathyroid glands, adrenal glands, occurring in society in 5%-10% of cases of secondary hypertension (Bassareo et al., 2023) , factors that influence the symptoms of hypertension Drink coffee (caffeine), obesity, consumption rich in sodium/sodium, age, genetics, smokers and alcohol drinkers (Siwi & Susanto, 2020) . Obesity can cause hypertension through various mechanisms, both directly and indirectly. Obesity can directly cause an increase

in cardiac output because the greater the body mass, the greater the amount of blood circulating so that cardiac output also increases. Indirectly, through stimulating the activity of the sympathetic nervous system, while smoking can damage the endothelial lining of blood vessels, cigarettes contain nicotine and carbon dioxide which can cause the elasticity of blood vessels to decrease and cause the effect of increasing blood pressure.

Hypertension cases caused by lifestyle can be prevented or treated by exercising as protection and medication for hypertension cases. This is supported by (Yakasai et al., 2021) in their research showing that moderate intensity aerobic exercise plays a role in controlling blood pressure. Exercise is beneficial for hypertension sufferers because it can increase heart rate, vasodilate blood vessels so that blood flow becomes smoother, and reduces the hormone nonepinephrine if done regularly. WHO recommends doing physical activity for 150 minutes/week at moderate intensity or 75 minutes/week at high intensity to improve the quality of people's fitness and health. Combining aerobic exercise with weight training at least 2 times/week, with regular physical activity will increase a person's life expectancy, especially in the prevention and treatment of hypertension (Dempsey et al., 2018) .

Weight training will burn more calories, stimulate the immune system, and improve the cardiovascular system because it requires a lot of oxygen consumption. Moderate intensity aerobic exercise for 30 minutes a day using 50%-70% of maximum heart rate will reduce blood pressure by 3-7 mmHg measured at rest (Muhammad et al., 2020) .

Weight loss is best achieved by combining calorie reduction and physical activity. The ideal approach is gradual and results in long-lasting weight loss, with a weekly loss goal of 1 to 2 kg. A reduction of approximately 1 mmHg is expected for every kilogram of weight loss, among individuals with obesity and hypertension who meet appropriate criteria (body mass index >35 [calculated as weight in kilograms divided by height in meters squared] and uncontrolled hypertension) , bariatric surgery can cause major weight loss and significantly increase blood pressure.

Physical activity: Most clinical trials show the effect of lowering blood pressure. Physical activity has used aerobic exercise such as brisk walking, swimming, dancing, or gym exercises, but dynamic resistance such as hand grips or yoga are also beneficial. Based on clinical trial evidence, an exercise duration of 40 to 60 minutes at least 3 times per week is optimal for lowering blood pressure.

Physical activities carried out include cycling, gardening, walking, mopping, washing, while sports exercises carried out must pay attention to Frequency, Intensity, Time, Type and Enjoy (FITTE). Sports that can be done by hypertension sufferers include walking, jogging, swimming, cycling. The following is an explanation from FITT:

Table 2Training Program

	Explanation	Explanation
Frequency	3-4 times a week	2 times a week
Intensity	Moderate (40-60%) maximum heart rate	Medium (10-25%) 1 RM 6-8 repetitions 1-2 sets
Time	40 minutes per training session	40 minutes per training session
Enjoy	Sufferers carry out activities with pleasure and enjoyment	

IV. CONCLUSION

Implementing a healthy lifestyle by carrying out a sports training program properly and correctly will increase a person's life expectancy. Exercise can prevent and treat hypertension. Exercise must be done with the right program for hypertension sufferers, which can be consulted with a personal trainer and doctor. People with hypertension should not exercise to hold their breath for too long because it can break blood vessels due to the pressure applied.

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