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The Impact of Aerobic Dance Intensity on Blood Pressure Reduction in Physically Active Elderly Women

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Abstract

This study aims to determine the relationship between aerobic dance intensity and blood pressure reduction in active elderly women who routinely participate in community exercise programs. The research design used is correlational with a quantitative approach. The sample consists of members of the aerobic dance community in Taman Pakui Sayang (TPS), Makassar, comprising 20 elderly women aged 45–59 years who participate in aerobic dance at least twice a week for 8 weeks. Data were collected through blood pressure measurements before and after the intervention, as well as monitoring exercise intensity using the Borg RPE (Rating of Perceived Exertion) Scale. The results of the analysis showed a significant negative correlation between aerobic dance intensity and a decrease in systolic with r = -0.62; p = 0.001 and diastolic (r = -0.55; p = 0.004) blood pressure. These findings indicate that the higher the intensity of the exercise performed, the greater the decrease in blood pressure that occurs. Thus, moderate to high intensity aerobic dance can be an effective non-pharmacological strategy in the management of hypertension in elderly women.

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INTRODUCTION

Hypertension remains a significant global health problem, especially in the elderly. Data from the World Health Organization (WHO) shows that the prevalence of hypertension increases progressively with age and is one of the main risk factors for cardiovascular disease and stroke. (Kim et al., 2024; Camara et al., 2024). In Indonesia, Riskesdas 2018 reported that more than 60% of hypertension cases were not diagnosed early, especially in the age group over 45 years, who are classified as early elderly (Oktamianti et al., 2023; Mahwati et al., 2022).

Efforts to lower blood pressure through non-pharmacological approaches are increasingly gaining attention, one of which is through physical activity such as aerobic dance. This activity is easily accessible, collective, and has broad physiological benefits (Leeyio et al., 2025; de Barcelos et al., 2022). However, although the benefits of aerobic dance on blood pressure have been widely studied, the aspect of exercise intensity has not been studied in depth in the context of lowering blood pressure, especially in elderly women aged 45–59 years who are in a physiological transition period towards advanced elderly.

The intensity of exercise in aerobic dance is one of the main components that determines the extent to which the body gets physiological benefits, especially in the cardiovascular system. Exercise intensity refers to how hard the body works during physical activity, and this parameter has a direct influence on the adaptations that occur in the heart, blood vessels, and respiratory system.(Gonçalves et al., 2021; Astorino et al., 2022). In aerobic dance practice, intensity is often measured and monitored using the Borg RPE (Rating of Perceived Exertion) Scale, a subjective scale that reflects an individual's perception of the level of fatigue felt during an activity. This scale is particularly useful in adult and elderly populations, as it allows for adjustment of training loads without having to rely on complex technological devices, while reducing the risk of overtraining or injury.(Eisenberger et al., 2022; Milani et al., 2024). Moderate to high intensity exercise is more effective in stimulating positive adaptations in the cardiovascular system, such as increased aerobic capacity, decreased resting heart rate, and improved systolic and diastolic blood pressure.(Luo et al., 2024; Romero-Vera et al., 2024). Exercise at this intensity can increase insulin sensitivity, improve lipid profiles, and decrease peripheral vascular resistance, all of which contribute to overall heart health (Alghadir et al., 2024; Feng et al., 2024). On the other hand, low-intensity exercise tends to produce more limited benefits and requires a longer duration to achieve the same effect.(Zhang et al., 2021; Guo et al., 2023). Setting the right and measured exercise intensity in an aerobic exercise program is crucial for maximizing health benefits, especially for individuals at risk of cardiovascular disorders, such as hypertension.

High blood pressure, both systolic and diastolic, is a chronic condition that has the potential to cause serious impacts if not treated effectively. Continuously elevated blood pressure can cause progressive damage to the cardiovascular system, including thickening and hardening of the artery walls (atherosclerosis), enlargement of the left ventricle of the heart, and increased risk of heart failure and stroke (Masenga & Kirabo, 2023; Nemtsova et al., 2023). High blood pressure also puts excess pressure on the kidneys, which in the long term can cause decreased kidney function and even chronic kidney failure (Liu et al., 2024; Ameer, 2022). To prevent these complications, non-pharmacological interventions such as structured physical activity, especially aerobic exercise, are highly recommended in blood pressure management strategies.

Aerobic exercise including aerobic dance performed at the right intensity, either moderate or high, depending on the individual's capacity, can stimulate the autonomic nervous system and hormones that play a role in regulating blood vessel tone (Lan et al., 2025; Coretti et al., 2024). Through physiological mechanisms such as increased nitric oxide production and decreased sympathetic nervous system activity, aerobic exercise can stimulate vasodilation, which is the widening of blood vessels, thereby facilitating blood flow and reducing peripheral resistance. This effect will contribute directly to lowering blood pressure naturally, without relying on antihypertensive drugs (Arefirad et al., 2022; Otsuki et al., 2019). Aerobic exercise also strengthens the heart muscle, increases the elasticity of the arteries, and reduces oxidative stress, all of which play important roles in long-term blood pressure control.(Manojlović et al., 2021; El Assar et al., 2022). Integration of aerobic exercise into daily lifestyle, especially in at-risk groups such as the elderly, is a very beneficial preventive measure in maintaining overall cardiovascular health.

The age group of 45–59 years is often categorized as early elderly, namely individuals who are starting to enter the transition phase towards old age, where there is a gradual and progressive decline in physiological function. This decli-

ne includes various body systems, such as the cardiovascular, musculoskeletal, and metabolic systems, which have an impact on decreasing physical fitness and increasing the risk of degenerative diseases. In women, this age range is also marked by significant hormonal changes related to the post-menopausal phase, including decreasing estrogen levels. These hormonal changes can trigger an imbalance in the cardiovascular system, one of which is marked by increased blood pressure, so that the risk of hypertension becomes higher (Du et al., 2025; Dai et al., 2025). In this context, regular physical activity, such as aerobic dance, is highly recommended as part of a preventive and rehabilitative approach to various health disorders that are common in early elderly. Aerobic dance that is done consistently has been shown to increase blood vessel elasticity, lower blood pressure, and improve heart function and overall body metabolism (Arfanda, 2023; Arfanda et al., 2022). Promotion and implementation of physical activity programs appropriate to the capacity of individuals in this age group is crucial to maintaining quality of life and preventing future health complications.

This study aims to analyze the relationship between aerobic dance intensity and decreased systolic and diastolic blood pressure in active elderly women aged 45 to 59 years who regularly follow an exercise program.

While numerous studies on exercise and hypertension have focused on general elderly populations (usually aged 60+), this research uniquely investigates women in the early elderly phase (45–59 years), a critical transitional age with hormonal changes and increasing cardiovascular risk. This focus fills a gap in literature by providing targeted data and recommendations for this under-researched age bracket.

METHODS

This study used a quantitative correlational design and is a quasi-experimental research. The number of respondents was 20 people, with the criteria of women aged 45-59 years, following an aerobic dance program in the Taman Pakui Sayang (TPS) Makassar community, at least 2x per week, not taking hypertension medication in the last 1 month, and initial blood pressure ≥ 140/90 mmHg. Hypertension occurs when the pressure in the blood vessels is above 140/90 mmHg. The independent variable is the intensity of aerobic dance measured using the Borg RPE scale (6-20), and the dependent variable is the decrease in blood pressure measured using a sphygmomanometer or Omron HEM-7130 brand tensiometer. The data collection procedure by measuring initial blood pressure and re-measurement after 8 weeks of exercise, the implementation of aerobic dance was carried out for 8 weeks, 2x per week, duration 45 minutes/session, measurement of exercise intensity for each session using the Borg RPE Scale. The Borg RPE scale norms are as follows **Table 1.**

Table 1. Borg RPE Scale

Scale	Category
6-8	Mild to moderate
9-11	Currently
12-14	Moderate to severe
15-17	Heavy
18-20	Very heavy

Table 1 illustrates the categories of physical activity intensity based on individual perception. The RPE score ranges from 6 (very light) to 20 (very vigorous), and is used to monitor the level of fatigue during exercise. This scale helps to adjust the intensity of exercise according to the individual's ability.

RESULTS AND DISCUSSION

The baseline profile of respondents included age, BMI, exercise intensity, and blood pressure reduction after the intervention. These data were used to describe the general characteristics of the participants as presented in **Table 2.**

Table 2. Data on the characteristics of respondents

Parameter	Mean	SD	Min	Max
Age (years)	51.5	4.1	45	59
BMI (kg/m2)	25.6	0.43	24.8	26.3
Intensity (RPE)	14.1	0.74	13	15
Systolic Decrease (mmHg)	13.9	1.14	11	15
Diastolic Decrease (mmHg)	9.0	0.67	8	11

Table 2 shows that the average age of participants was 51.5 years with a range of 45–59 years, reflecting the early elderly group. The participants' Body Mass Index (BMI) was at an average of 25.6 kg/m², indicating a mild overweight category with small variations. The intensity of aerobic dance was measured using the Borg RPE Scale with an average of 14.1, indicating that the

exercise was performed at moderate to high intensity. The results of the intervention showed an average decrease in systolic blood pressure of 13.9 mmHg and diastolic blood pressure of 9.0 mmHg, reflecting the effectiveness of aerobic dance in lowering blood pressure physiologically.

Table 3. Results of Pearson Correlation Analysis

Borg RPE Score	Blood pressure	R	Sig. (p)
Aerobic Dance Intensity	Systole	-0.62	0.001**
	Diastole	-0.55	0.004**

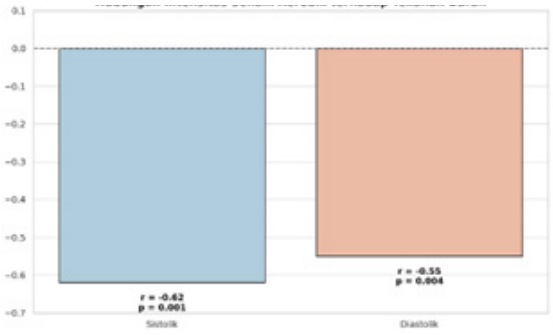

Figure 1. Pearson Correlation Analysis Results Diagram

Table 3 and **Figure 1** show a significant negative correlation between aerobic dance intensity and blood pressure. The higher the exercise intensity, the greater the decrease in systolic blood pressure at r = -0.62; p = 0.001, and diastolic at r = -0.55; p = 0.004. These results indicate that aerobic dance intensity contributes significantly to lowering blood pressure in active elderly women.

The results of this study convincingly show a significant negative relationship between the intensity of aerobic dance performed by active elderly women and a decrease in blood pressure, both in systolic and diastolic components, which means that the higher the intensity of exercise performed regularly, the greater the decrease in blood pressure that can be achieved by individuals in that age group. The negative correlation found illustrates that the body's physiological response to increased aerobic dance loads has a positive impact on the cardiovascular system, especially through increased blood vessel elasticity and decreased peripheral resistance, which ultimately lowers blood pressure effectively.

In this study, the average exercise intensity achieved by the participants was in the moderate to heavy category, with a Borg RPE score of 14.1, and a range of values between 13 and 15, which is clinically and physiologically included in the optimal zone to stimulate body adaptation, such as increasing the efficiency of heart work, the capacity of blood vessels to flow blood, and the balance of the autonomic nervous system, without providing excessive load that is dangerous for the elderly group. The decrease in blood pressure recorded after 8 weeks of the aerobic dance program was 13.9 mmHg for systolic pressure and 9.0 mmHg for diastolic pressure. This value has significant clinical meaning, because a decrease in systolic pressure of only 10 mmHg is known to substantially reduce the risk of stroke and coronary heart disease. This finding is in line with the physiological theory that states that moderate to high intensity aerobic dance can increase blood vessel elasticity, stimulate vasodilation, and reduce peripheral resistance, which directly impacts blood pressure reduction (Leeyio et al., 2025; Königstein et al., 2023).

The average intensity score of 14.1 on the Borg RPE Scale, achieved by participants during the aerobic dance program, indicates that the physical activity performed was at a moderate to vigorous intensity level that is scientifically recognized as a safe and effective zone for the elderly, as it can provide a stimulus strong enough to stimulate positive adaptations in the cardiovascular system without exceeding the threshold of their physiological capabilities. This intensity is considered ideal because on the one hand it is high enough to trigger an increase in heart rate, stroke volume, and blood vessel elasticity, all important elements in improving cardiovascular fitness and lowering blood pressure, but on the other hand it is still within the safe tolerance range for the elderly, so that the risk of excessive fatigue or injury can be minimized (Liang et al., 2024; Manojlović et al., 2021). Moderate to high intensity physical exercise not only contributes to lowering blood pressure through peripheral mechanisms, but also plays an important role in regulating the autonomic nervous system, namely by suppressing the activity of the sympathetic nervous system which is usually associated with increased blood pressure and cardiovascular stress, while increasing the dominance of the parasympathetic system which functions in vascular relaxation and decreasing heart rate, so that overall the process of lowering blood pressure takes place physiologically, sustainably, and safely for physically active elderly women.(Lee et al., 2022; Badrov et al., 2022).

Aerobic dance performed at moderate to high intensity not only has a direct impact on lowering blood pressure, but also produces a variety of additional physiological benefits that contribute to overall health improvement, espe-

cially for older women. One important benefit is increased insulin sensitivity, which helps the body regulate blood glucose levels more efficiently, thereby reducing the risk of insulin resistance and type 2 diabetes that often accompany hypertension in older age.(Arimbi et al., 2019; Arfanda et al., 2024). Moderate to high intensity exercise has also been shown to reduce levels of oxidative stress, an imbalance between the production of free radicals and the body's ability to neutralize them, which if uncontrolled can damage blood vessel endothelial cells and worsen cardiovascular conditions. On the other hand, physical activity at this intensity also supports improvements in lipid profiles, characterized by increased levels of HDL (good cholesterol), decreased LDL (bad cholesterol), and triglycerides, which synergistically reduce the risk of atherosclerosis and coronary heart disease.(Sert et al., 2025; Li et al., 2024). In the context of this study, the use of the Borg RPE Scale as a measure of exercise intensity has its own advantages, as it allows participants to adjust the exercise load based on their subjective perception of perceived fatigue. This is particularly important in the elderly population, where physical capacity varies widely and the use of technology-based intensity measures may not always be available or appropriate. Thus, this perception-based approach not only improves exercise safety, but also ensures that each individual is participating in the optimal exercise intensity to achieve maximum benefits, while minimizing the risk of injury or excessive fatigue.(Tiggemann et al., 2021; McAuliffe et al., 2018).

This study also strongly underscores the importance of careful monitoring of exercise intensity in any exercise program aimed at older adults, especially since this population has a higher level of physiological vulnerability than younger age groups. Exercise intensity that is too low, although it may feel safe and comfortable, risks not producing enough physiological effects to significantly improve cardiovascular function or reduce blood pressure optimally. As a result, participation in a poorly measured low-intensity exercise program may be less effective as a long-term health intervention. Conversely, exercise at too high an intensity, without proper monitoring or adjustment, has the potential to cause excessive fatigue, musculoskeletal injuries, acute increases in blood pressure, and even cardiac complications in individuals with certain health conditions. (Reljic et al., 2022; Gonçalves et al., 2021). Approaches based on individualized intensity, such as the use of the Borg RPE Scale, are very relevant and important in the context of exercise for the elderly. This scale allows each individual to adjust the intensity of exercise based on subjective perceptions of the level of fatigue felt, thus creating a balance between effectiveness and safety. In a mass and heterogeneous community exercise program, the application of this approach is a practical and efficient solution because it does not require complex physiological measuring instruments, but is still able to maintain the quality and benefits of exercise personally. Thus, intensity monitoring that is carried out consistently and based on individual perceptions can increase the success of the elderly exercise program in terms of physical health, participation compliance, and safety of its implementation.(Tiggemann et al., 2021; Busching & Schmid, 2025).

Finally, these findings are consistent with previous studies showing that structured aerobic activity can significantly lower blood pressure, even without pharmacological intervention. Thus, exercise intensity is an important component that needs to be considered in designing an aerobic dance program for the elderly. Regular exercise, with the right duration and intensity, has been shown to be effective in helping to manage high blood pressure and improve the quality of life of elderly women.

CONCLUSION

There is a significant negative relationship between the intensity of aerobic dance and the decrease in systolic and diastolic blood pressure in active elderly women. The higher the intensity of the exercise performed in the moderate to heavy range, the greater the decrease in blood pressure achieved. Aerobic dance with measured intensity can be used as an effective non-pharmacological strategy in managing hypertension in the elderly group of women aged 45–59 years. The recommendation from these results is the importance of routine training with intensity monitoring using the Borg RPE Scale in community exercise programs to optimally support the cardiovascular health of the elderly.

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