

# The impact of maumere gymnastics on blood pressure reduction in hypertensive patients: A promising non-pharmacological intervention

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## ABSTRACT

Hypertension is one of the biggest causes of morbidity in the world, often referred to as a silent killer. This study aimed to investigate the effectiveness of Maumere exercise, a non-pharmacological therapy, in reducing blood pressure among hypertensive individuals in Padang City. An experimental research design with a pretest-posttest approach was employed, involving 20 participants aged 25 years and older who had a history of stage 1 hypertension. Blood pressure measurements were obtained using a sphygmomanometer, and the data were analysed using t-tests or regression analysis. The findings demonstrated that Maumere exercise therapy effectively reduced systolic blood pressure by 43.5% and diastolic blood pressure by 48.7%. Additionally, Maumere gymnastic exercises were found to have a positive impact on heart rate control. Regular exercise led to improved cardiovascular adaptation, resulting in better blood pressure control. This study contributes by providing empirical evidence regarding the efficacy of Maumere exercise as a non-pharmacological therapy for reducing blood pressure in hypertensive patients. It highlights the significant reduction in systolic and diastolic blood pressure achieved through four weeks of Maumere gymnastics, supporting its potential as an alternative approach to hypertension management. Future research should consider larger-scale studies with diverse populations, explore the long-term effects of Maumere exercise, and investigate the optimal duration, frequency, and intensity of exercise sessions to develop standardised guidelines for its implementation.

**Keywords:** Maumere gymnastics; blood pressure; hypertension

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## INTRODUCTION

Hypertension is a degenerative disease that is not contagious. The magnitude of the increase in non-communicable diseases is very visible in Southeast Asia, such as in Indonesia (Amila et al., 2021; Fedacko et al., 2022; Schröders et al., 2017). Hypertension is one of the biggest causes of morbidity in the world as a silent killer (Kasper et al., 2015; Qamar & Braunwald, 2018; Ramawat et al., 2020; Touyz & Schiffrin,

2021). Hypertension is a major risk factor for coronary heart disease, heart failure, and stroke (Alloubani et al., 2018; Fuchs & Whelton, 2020). WHO data for 2019 shows that the prevalence of hypertension in the world has reached 1.13 billion individuals (Dzau & Balatbat, 2019; Mills et al., 2020). The number of people with hypertension is expected to continue to increase in 2025, with deaths reaching 9.4 million individuals (Kasper et al., 2015; Halim et al., 2022). The prevalence of hypertension globally is 22% of the total world population, and minimal effort is made to control blood pressure (Fisher & Curfman, 2018; Zhou et al., 2021).

Hypertension is a threat to public health, with the potential to cause complications such as stroke, coronary heart disease, and kidney disease (Lv & Zhang, 2019). The prevalence of hypertension sufferers in Indonesia through data from the 2018 Basic Health Research (Riskesdas) (34.1%), has increased compared to 2013 (25.8%) (Berek et al., 2022; Hadi et al., 2022). Basic Health Research Results (2018) reported a 34.1% rate of hypertension at the age of over 18 years. 31.6% in the age group 31-44 years, 45.3% in the age group 45-54 years, and 55.2% in the age group 55-64 years (Livana & Basthomi, 2020). Meanwhile, the prevalence in Padang City is 21.7%, which means that it is close to the national figure (Gusty & Merdawati, 2020). Hypertension is the second highest disease in Padang City (Ikbal & Sari, 2019; Putra & Serudji, 2021). According to the Padang City Health Office, the number of people with hypertension increased in 2016 (47.902) and 2017 (52.825) (Neherta & Nurdin, 2021). The city of Padang has made several efforts to control cases of hypertension such as reducing salt consumption, not smoking, and a balanced nutritional diet (Hardiyanto et al., 2020; Susanti et al., 2020).

Exercise is very influential for people with hypertension in increasing immunity, preventing obesity, regulating blood glucose levels, normalizing blood pressure, and increasing work ability (Caselli et al., 2019; Lopes et al., 2018; Thompson et al., 2020). Exercise is a risk factor for hypertension. In theory, physical activity greatly affects the stability of blood pressure. In people who are not actively doing activities tend to have a higher heart rate frequency. Exercise can lower total cholesterol, help improve blood lipid profiles, Low Density Lipoprotein (LDL), triglycerides and increase High Density Lipoprotein (HDL) reduce blood pressure and improve the hemostatic system (Al-Sawalha et al., 2019; Lumempouw et al., 2016).

Exercise is an integral component of the primary and secondary management of hypertension and CVD. Current guidelines recommend that adults at increased risk of CVD should engage in regular aerobic type exercise of moderate and/or vigorous intensity (Eckel et al., 2014). There is strong evidence showing that aerobic exercise can benefit various risk factors for CVD such as low cardiorespiratory fitness, insulin resistance and visceral overload and ectopic adiposity (Sabag et al., 2017). Maumere gymnastics has been attracting increasing attention as a possible time effective alternative to traditional aerobic exercise (Way et al., 2019). Repetitive high-intensity exercise, interspersed with low-intensity recovery activities, and is thought to stimulate greater cardiometabolic changes during and after exercise (Tordi et al., 2010; Weston et al., 2014). In contrast, moderate-intensity sustained training (MICT) is considered “traditional” aerobic exercise and is performed continuously bouts of moderate-intensity aerobic activity at steady state for a defined duration (usually around 20-60 minutes) (Way et al., 2019).

The definition of gymnastics is physical exercise arranged systematically involving selected and planned movements. Gymnastics is very useful in developing the physical components and motor abilities. People who are involved in gymnastics will develop muscle endurance, strength, power, flexibility, coordination, agility, and balance. Gymnastics is a physical activity that can provide changes to all the functions of the body's systems, including increasing cardiac output and adjusting the distribution of cardiac output, as well as stimulating the release of endorphins which function as natural sedatives to reduce high blood pressure (Sulistiyana, 2022).

Lack of physical activity can increase a person's risk of developing hypertension, people who are inactive tend to have a higher heart rate so that the heart muscle has to work harder during contractions. Lack of physical activity can also increase blood pressure, with regular exercise it is hoped that it can lower blood pressure by itself (Harahap et al., 2017). Sports such as gymnastics, running, swimming, and cycling can be beneficial for lowering blood pressure and improving heart conditions (Jakše et al., 2021; Xie, 2020).

Regular exercise for 30 minutes 3-4 times a week is highly recommended to lower blood pressure and can increase HDL levels which can reduce the formation of atherosclerosis due to hypertension (Liu et al., 2018; Xia et al., 2022; Yang et al., 2021).

There have been many studies on lowering blood pressure, but there are many limitations at certain ages, namely the elderly (Benetos et al., 2019; El-Hajj & Kyriacou, 2020). Exercise has a very significant effect on reducing blood pressure in the elderly (Ge et al., 2022; Zhang et al., 2022). There are differences in the effectiveness of taichi exercise for reducing blood pressure in the elderly with a history of hypertension (Kang et al., 2022). The limitations of the research conducted by 2 researchers were samples based on a certain age, no control over nutritional intake, and only using elderly gymnastics. While people with hypertension are not only the elderly but productive age (18-30 years) (Di Renzo et al., 2020; Motsa et al., 2021).

The solution offered for reducing blood pressure in hypertension sufferers is to do Maumere gymnastics as a non-pharmacological therapy. Maumere gymnastics can lower blood pressure levels by stimulating a decrease in sympathetic nerve activity and an increase in parasympathetic nerve activity which affects a decrease in the hormones adrenaline, norepinephrine, and catecholamines as well as vasodilation in the blood vessels which causes the transport of oxygen throughout the body, especially the brain smoothly so that it can reduce blood pressure and pulse be normal (Panagiotou et al., 2021; Rossi et al., 2020; Zheng et al., 2022). Maumere gymnastics is a low impact exercise where all ages can follow this gymnastic movement (Hicks, 2020). Their energetic movements and upbeat songs can increase endurance and muscle strength if done regularly (Astrawan & Jaya, 2021; Saumaa, 2020).

A person's risk of getting hypertension can be reduced by checking blood pressure regularly, maintaining ideal body weight, reducing salt consumption, and stopping smoking. The impact on people with hypertension is rupture of blood vessels, kidney damage, and paralysis. These diseases can be prevented with proper management of hypertension. Management of hypertension includes pharmacological therapy through drugs and non-pharmacological therapy with lifestyle. Active movement can be done by exercising properly, correctly, measurably, and regularly. In accordance with the field of research, research will be carried out with non-pharmacological therapy with Maumere gymnastics.

## METHOD

Research method used in this study was an experimental method (Experimental research), namely to examine the effect or relationship between the independent variable (X), which is called the treatment factor, and the dependent variable (Y), which is called the observation factor. The independent variable in this study was Maumere gymnastics while the dependent variable was blood pressure in hypertension sufferers. The approach method in this study used a pretest-posttest, to find out how much the Maumere exercise affects the decrease in blood pressure in people with hypertension. The data obtained were analyzed using simple regression. The sample criteria used were those with hypertension aged 25 years and over, and are not physically impaired and can see and hear. The number of samples in this study were 20 people with hypertension.

The stages of the research carried out were: a) Collection of samples and explanations to the samples regarding the research to be carried out. If the sample is willing, the sample will fill in the informed consent b) Pretest by measuring blood pressure through a sphygmomanometer. 15 minutes before doing gymnastics c) The sample is given the Maumere gymnastic intervention for 4 weeks with 3 meetings in 1 week d) Then a Posttest is carried out by measuring blood pressure again at the 15th meeting after 30 minutes of doing gymnastics e) After the data is obtained, the data is analyzed via ANOVA.

## RESULTS AND DISCUSSION

In the chapter the results of the research and discussion are presented sequentially including: (1) research data, (2) analysis prerequisite tests, and (3) hypothesis testing.

## 1. Description of Research Data

Descriptive statistical data on pretest and posttest blood pressure of hypertensive patients in Padang City are presented in table 1 as follows:

**Table 1. Descriptive Pretest and Posttest Blood Pressure Statistics**

Statistics	Pretest results		Posttest results	
	Systolic	Diastolic	Systolic	Diastolic
Amount	3071	1813	2801	1692
Average	154	91	140	85
SD	8.09	5.89	11.18	4.87

From table 1 above there are differences in pretest and posttest values. Good results are seen if the pretest and posttest values are quite different. The lower the posttest value, the better the value of reducing blood pressure in hypertension sufferers after being given Maumere exercise therapy.

## 2. Prerequisite Test Results

### a. Normality Test

The data normality test in this study used the Kolmogorov Smirnov method. The results of the data normality test performed in each analysis group were carried out with the SPSS version 20.0 for windows software program with a significance level of 5% or 0.05. The summary of the data is presented in table 2 as follows:

**Table 2. Normality Test**

Data	p.s	Sig	Information
Systolic	0.200	0.05	Normal
Diastolic	0.064		Normal

Based on the statistical analysis of the normality test that has been carried out using the Kolmogorov Smirnov Z test, on all pretest and posttest data obtained from the results of the data normality test the significance value is  $p > 0.05$ , which means that the data is normally distributed.

### b. Hypothesis Test Results

Testing the research hypothesis was carried out based on the results of data analysis and interpretation of the t-test analysis. The sequence of hypothesis testing is as follows:

#### 1) The Effect of Maumere Exercise Therapy on Reducing Systolic Blood Pressure

The t-test was used to test the hypothesis which reads "There is an effect of Maumere gymnastics on reducing systolic blood pressure in hypertension sufferers in Padang City", based on the results of the pretest and posttest. If the results of the analysis show a significant difference, the Maumere exercise will have an effect on systolic blood pressure. The conclusion of the study is stated to be significant if the t-count  $>$  t-table and the sig value is less than 0.05 (Sig  $<$  0.05). Based on the results of the analysis obtained data in table 3 as follows.

**Table 3. Systolic Pre-Test and Post-Test Results t-Test**

Group	Average	t-Test for Equality of Means		
		th	tbh	Sig.
Pre-Test	154	3,724	2045	0.002
Post-Test	140			

From the results of the t-test it can be seen that t-count = 3.724 and t-table = 2.045 (df 19) with a significance value of p of 0.002. Because t-count is  $3.724 >$  t-table = 2.045, and a significance value of  $0.002 <$  0.05, these results indicate that there is a significant difference. Thus, the alternative hypothesis ( $H_a$ )

which reads “There is an effect of Maumere gymnastics on reducing systolic blood pressure in hypertension sufferers in Padang City”, is accepted. From the pretest data it has an average of 154, then during the posttest the average reaches 140.

## 2) The Effect of Maumere Exercise Therapy on Reducing Diastolic Blood Pressure

The t-test was used to test the hypothesis which reads “There is an effect of Maumere gymnastics on reducing diastolic blood pressure in hypertensive patients in Padang City”, based on the results of the pretest and posttest. If the results of the analysis show a significant difference, the Maumere exercise has an effect on diastolic blood pressure. The conclusion of the study is stated to be significant if the t-count > t-table and the sig value is less than 0.05 (Sig < 0.05). Based on the results of the analysis obtained data in table 4 as follows.

**Table 4. T-test Diastolic Pretest and Posttest Results**

Group	Average	t-Test for Equality of Means		
		th	tbh	Sig.
Pre-Test	91	4.133	2045	0.001
Post-Test	85			

From the results of the t-test it can be seen that t-count = 4.133 and t-table = 2.045 (df 19) with a significance value of p of 0.002. Because t-count is 4.133 > t-table = 2.045, and a significance value of 0.002 < 0.05, these results indicate that there is a significant difference. Thus, the alternative hypothesis (Ha) which reads “There is an effect of Maumere gymnastics on reducing diastolic blood pressure in hypertension sufferers in Padang City”, is accepted. From the pretest data it has an average of 91, then during the posttest the average reaches 85 .

## 3) The Contribution of Maumere Exercise to Reducing Systolic and Diastolic Blood Pressure

Based on the results of the analysis of the magnitude of the effect of Maumere gymnastics on reducing systolic and diastolic blood pressure, the data obtained in table 5 is as follows:

**Table 5. The Contribution of Maumere Exercise Therapy**

Group	R	R Square	%
Systolic	91	0.435	43.5
Diastolic	85	0.487	48.7

From the results of the analysis it can be seen that the R Square value of Maumere gymnastics for systolic blood pressure is 0.435 with a percentage of 43.5%. Thus, the magnitude of the effect of Maumere exercise therapy on reducing systolic blood pressure is as much as 43.5%. Furthermore, from the results of the analysis, it can be seen that the R Square value of Maumere gymnastics for diastolic blood pressure is 0.487 with a percentage of 48.7%. Thus, the magnitude of the effect of Maumere exercise therapy on reducing diastolic blood pressure is 48.7%.

Based on the analysis of the data table 5, it can be seen that Maumere exercise therapy has an effect on reducing blood pressure in hypertension sufferers in the city of Padang. A good effect will be obtained if Maumere exercises are carried out regularly, namely at least three to four times a week. In addition to doing maumere exercises, to get maximum results, people with hypertension must pay attention to the following things, namely consuming nutritious and balanced food, reducing excessive salt consumption, reducing foods that are high in fat content, getting enough rest, avoiding stress, and doing regular exercise.

These findings can help people with hypertension step 1 perform non-pharmacological blood pressure lowering therapy, namely by doing Maumere exercises to control blood pressure (Júnior et al., 2021; Mahmood et al., 2019; Saladini et al., 2022). Maumere exercise will trigger the heart to work when pumping blood, so that the heart muscles will get stronger so that in the end the heart does not have to work harder when pumping blood to meet the oxygen needs in the body (Allotey et al., 2020; Koepp et al., 2020; Widana

et al., 2021; Xie et al., 2021). If therapy is not carried out early on, the blood pressure of step 1 hypertension sufferers will increase with age (Flack & Adekola, 2020; Hauspurg et al., 2019; Hinton et al., 2020).

The results of this study are in line with the results of previous studies which also wanted to know about the impact exercise on blood pressure reduction in hypertensive patients (Aalen et al., 2019; Ozemek et al., 2020; Wheeler et al., 2019). Furthermore, regarding the 3 relevant studies, the research conducted by researchers has similarities and the difference is in terms of the similarity that the impact of exercise can help lower blood pressure. And in terms of differences there are differences in the sports exercises used and the number of samples that contribute.

Apart from being physically beneficial, Maumere gymnastics is also beneficial for the mental health of hypertension sufferers in the city of Padang. This is in accordance with the American Heart Association (AHA), which explains that stress can be relieved by doing exercise. Stress can increase a person's blood pressure, because the heart works harder to pump blood to supply more oxygen throughout the body. If stress is not controlled properly, the higher the blood pressure of people with hypertension, it can even cause death (Qi et al., 2023).

Maumere gymnastics has a significant impact on reducing blood pressure. This is due to the Maumere exercise movement being able to trigger the heart pump, so that if it is done routinely and regularly, the rhythm of the heart pump will be more regular which causes stability in blood pressure. In contrast to previous studies, Maumere gymnastics is more used for general fitness for the elderly, and Maumere gymnastics is more used for joint gymnastic activities without identifying the benefits of Maumere gymnastics (Wu et al., 2023).

## CONCLUSION

This study contributes by presenting empirical evidence regarding the effectiveness of Maumere exercises as a non-pharmacological therapy for reducing blood pressure in hypertensive patients. It highlights a significant reduction in systolic and diastolic blood pressure achieved after four weeks of Maumere gymnastics, thus supporting its potential as an alternative approach to managing hypertension. However, it is important to acknowledge that this research has certain limitations. One limitation is the relatively small sample size, which necessitates caution when generalising the results. Additionally, this study only tracks the short-term effects of Maumere exercises, while the long-term impact still requires further investigation. Therefore, future research should consider larger-scale studies with more diverse populations. It should also explore the long-term effects of Maumere exercises and investigate the optimal duration, frequency, and intensity of exercise sessions to develop standardised guidelines for implementation. Consequently, this study provides a crucial foundation for the development of more effective non-pharmacological therapies in hypertension management and stimulates interest in further research in this field.

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## CONFLICT OF INTEREST

This study does not contain any conflicts of interest.

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