



# The Effect of Progressive Muscle Relaxation on Blood Pressure Reduction as An Effort to Prevent Emergencies in Hypertensive Patients

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## Abstract

*Hypertension, which is characterized by an increase in blood pressure above normal limits, is a health problem that can occur in all walks of life. People with hypertension are often unaware of this condition because it generally does not show obvious symptoms. If left untreated, hypertension can cause irreversible damage to the arteries, increase the risk of cardiovascular disease, and can lead to hypertensive emergencies. Hypertension can be prevented and managed with proper treatment, which can reduce the risk of serious complications such as stroke and heart attack. Progressive muscle relaxation is one of the non-pharmacological therapies that can be used to lower blood pressure. This technique combines deep breathing exercises, systematic contraction and relaxation of the body's muscle groups to help relieve physical and psychological tension. By reducing stress and muscle tension, and stimulating the nervous system to function more efficiently in regulating body functions related to blood pressure, a significant reduction in blood pressure is expected. This study aims to evaluate the effectiveness of progressive muscle relaxation techniques in reducing blood pressure in hypertensive patients as an effort to prevent hypertension emergencies. The method used was a pre-experimental design with a One Group Pretest-Posttest design. The research sample consisted of 66 respondents who participated in progressive muscle relaxation sessions. The results of data analysis showed a decrease in mean systolic blood pressure by 12.21 mmHg and diastolic by 10.96 mmHg. Statistical tests using Paired Sample t-test showed a p value <0.01, which indicates a significant difference at the 95% level of significance ( $\alpha = 0.05$ ). These findings indicate that progressive muscle relaxation is effective in reducing blood pressure in hypertensive patients and can be one of the efforts to prevent hypertensive emergencies.*

**Keywords:** *Blood pressure, Progressive muscle relaxation, Prevention of hypertensive emergencies.*

## INTRODUCTION

High blood pressure, or hypertension (HTN), occurs when blood pressure consistently reaches 140/90 mmHg or more. Blood pressure above 140/90 mmHg is considered hypertension. The top number, systolic pressure, is the highest pressure in the arteries when the heart beats and fills the arteries. Meanwhile, the lower number, the diastolic pressure, reflects the lowest pressure in the arteries when the heart relaxes between heartbeats (World Health Organization, 2021).

Blood pressure is the force exerted by blood on the walls of blood vessels. The pumping action of the heart produces pressure that pushes blood through the vessels. High blood pressure is a chronic medical condition in which the blood pressure in the arteries increases. This increase makes the heart work harder than usual to move blood through the blood vessels. Blood

pressure is the force exerted by the blood against the artery walls as the blood is pumped by the heart. Blood pressure is measured by two numbers. Systolic pressure (the top number), which indicates the blood pressure when the heart is beating and pumping blood. Diastolic pressure (the lower number), which indicates the blood pressure when the heart is resting between beats.(Warrell, D. A., Cox, T. M., & Firth, 2019).

Blood pressure consists of two measurements: systolic and diastolic, which reflect the pressure when the heart muscle contracts (systole) and when the heart relaxes between beats (diastole). Normal blood pressure at rest ranges from 100-140 mmHg for systolic (upper reading) and 60-90 mmHg for diastolic (lower reading). Chronic and uncontrolled hypertension can be a risk for emergencies where this is a condition where a person's blood pressure exceeds normal limits. (Heart.org., n.d.).A person is called having hypertension emergencies is with blood pressure more than 180 mmHg and diastolic above 120 mmHg accompanied by evidence of damage or worsening of target organs. (Loekman, 2016)(Alley, 2022).(Alley, 2023)

Hypertension is a silent killer in most cases because it does not show any symptoms until it causes death. In this clinical condition, hypertensive mediated organ damage occurs. Hypertension emergencies usually often occur due to high blood pressure that is not realised by the patient so that it is not treated or patients who are not controlled by adhering to treatment. There are several adverse effects that can be caused in cases of hypertension emergencies, including stroke, loss of consciousness, memory loss, heart attack, damage to the eyes and kidneys and chest pain.

Based on the 2018 Riskesdas, the prevalence of hypertension in the population aged >18 years in Indonesia was 34.1%, which shows an increase compared to the 2013 Riskesdas results which were recorded at 25.8%. The prevalence of hypertension by characteristics in 2018 showed that hypertension was higher in women (36.9%) than men (31.1%), as well as higher in urban areas (34.4%) and in groups with low educational background, as recorded in individuals who did not attend school (51.6%).(RISKESDAS, 2018).

Uncontrolled hypertension that reaches emergency levels can lead to target organ damage, such as heart, kidney and brain disorders. Rapid and controlled blood pressure reduction is essential in avoiding the risk of death or long-term disability. Hypertension emergencies are medical conditions that require immediate treatment due to the risk of severe organ damage or even death. Hypertensive emergency is a medical condition characterized by a very high increase in blood pressure that requires immediate medical attention to prevent severe organ damage or even death. Hypertensive emergencies usually occur when systolic blood pressure reaches  $\geq 180$  mmHg or diastolic blood pressure  $\geq 120$  mmHg, and is

accompanied by symptoms or signs of target organ damage, such as disorders of the heart (e.g., myocardial infarction), brain (stroke), or kidneys (acute renal failure).(PERHIPI), 2020)(World Health Organization, 2021).

**Risk factors for hypertension** The possible role of other factors such as stress, anxiety, fear that stimulates the emergence of adrenaline hormones and triggers the heart to beat faster and blood vessels to narrow so that it can trigger an increase in blood pressure, often in the prevention and treatment of hypertension stress is often ignored, it can increase the risk of high blood pressure, heart attack, and *stroke*.

Increased blood pressure is caused by various factors including psychological conditions such as anxiety and fear, stress, when the body is stressed the muscles will become tense this will affect the response of blood vessels to vasoconstrictor stimuli, individuals are very sensitive to norepinephrine although it is not clearly known why this can happen. At the same time the sympathetic nervous system stimulates the blood vessels in response to emotional stimulation. Increased blood pressure in the arteries can occur in several ways. Firstly, the heart pumps blood more vigorously, thus passing more fluid every second. Secondly, large arteries lose their elasticity and become stiff, which inhibits their ability to expand as the heart pumps blood. Thirdly, during each heartbeat, blood is forced to pass through narrower vessels than usual, which causes blood pressure to rise. The relationship between stress and hypertension has been extensively evaluated. Acutely, stress has been shown to increase blood pressure by increasing cardiac output and heart rate without affecting total peripheral resistance. Acute stress has been found to increase levels of catecholamines, cortisol, vasopressin, endorphins and aldosterone, which may partly explain the increase in blood pressure. In addition, acute stress reduces renal sodium excretion, which contributes to increased blood pressure. Some research suggests. Prolonged stress can predispose to developing hypertension. (Messerli, F. H., & Bangalore, 2020).

Relaxation techniques, such as progressive muscle relaxation, serve as a non-pharmacological treatment. These techniques promote a sense of calm, which triggers the baroreceptors in the hypothalamus to lower cortisol, epinephrine, and norepinephrine levels. The reduction in epinephrine and norepinephrine causes blood vessels to dilate, leading to decreased peripheral resistance, which in turn lowers blood pressure and heart rate (Azizah et al., 2021). While hypertension cannot be permanently cured, managing blood pressure is essential to prevent emergencies, complications, and improve the patient's quality of life. The goal of therapy is to maintain blood pressure within the normal range. One effective approach to managing hypertension is non-pharmacological therapy, which can be utilized as an

alternative in nursing interventions. Among these techniques, progressive muscle relaxation, which combines deep breathing with muscle relaxation, has been shown to lower blood pressure in individuals with hypertension.

Relaxation techniques such as progressive muscle relaxation as a non-pharmacological therapy can alter the body's physical and emotional response to stress by affecting the sympathetic nervous system. The sympathetic nervous system helps the body activate the fight-or-flight response. The sympathetic nervous system is more active when a person is stressed or in danger. PMR affects this system by reducing cortisol, which is the hormone involved in the stress response of a fight or flight situation. PMR can also lower blood pressure, metabolism, heart rate and respiratory rate, which usually increase during the stress response.

Progressive muscle relaxation (PMR) is a fundamental stress management technique developed by American physician Edmund Jacobson in the early 1920s to help his patients alleviate muscle tension. Jacobson's research established a connection between excessive muscle tension and a range of physical and psychological issues. His studies revealed that muscle tension is consistently linked with the shortening of muscle fibers, and reducing this tension can decrease central nervous system activity, leading to a state of relaxation. Jacobson proposed that since muscle tension is often related to psychological stress, such as anxiety, learning to relax muscles could help reduce anxiety.

Relaxation is a therapy performed by tensing certain muscles before finally relaxing. Progressive muscle relaxation is one method of relaxation technique that combines deep breathing exercises with a series of muscle contractions and relaxations. According to (Asmadi, 2019), progressive relaxation training technique is a method that has been proven effective in therapeutic programmes to overcome muscle tension as well as various complaints such as anxiety, insomnia, fatigue, muscle cramps, neck and waist pain, hypertension, mild phobia, and stuttering , also explain that progressive relaxation is a therapy that involves tensing certain muscles followed by relaxation. This technique combines deep breathing exercises with a series of specific muscle contractions and relaxations. (Smeltzer, S. C., & Bare, 2021)

## **METHODS**

The research design of this study uses a *Pre-Experimental* research design using a design (*One Group Pretest Posttest Design*) without a comparison group (control). In this design, one group before being given a certain intervention is observed during the *pre-test*, then observed again after being given the intervention treatment (*post test*) to determine the effect of the treatment. Cause and effect testing is done by comparing pre-test and post-test results.

The form of this design can be described as follows :

Pre Test	Intervensi	Pos Test
01	X	02

Keterangan :

01 : Measurement of blood pressure before being given the intervensi of progressive muscle relaxation therapy in Patients with Hypertension

02 : Measurement of blood pressure after being given the intervensi of progressive muscle relaxation therapy in Patients with Hypertension

X : Pemberian tindakan terapi relaksasi otot progresif pada penderita hipertensi

### ***Sampling procedures***

The population in this study were hypertensive patients in the work area of UPT puskesmas KM 11, after calculating the number of samples in this study were 66 people. Sampling in this study was carried out using Non Probability Sampling, namely Purposive Sampling. This technique is a sample by selecting a sample among the population according to the researcher's wishes. The implementation stage of this study begins with identifying respondents who meet the inclusion criteria, namely patients with grade 2 hypertension with BP  $\geq 160/100$  mmHg and are willing to become respondents in this study, then giving an explanation to hypertensive patients about the objectives, benefits, procedures and the right to refuse and guarantee confidentiality as respondents. Furthermore, the researcher will offer hypertensive patients to become respondents in research activities and sign the informed consent sheet provided by the researcher. The research was conducted at the KM 11 Puskesmas, Siempat Nempu Hulu District, Dairi Regency from May to September 2024.

### **The PMR Interventions**

Respondents who are willing before the intervention is carried out, first blood pressure is measured, then the instructor demonstrates progressive muscle relaxation, How to Perform Progressive Muscle Relaxation as follows: Preparation: Find a quiet and comfortable place. Sit or lie down in a relaxed position. Make sure the respondent will not be disturbed during the relaxation session. Initial Breathing: Start with a few deep breaths. Inhale slowly through the nose for 4-5 seconds or as much as the client can, hold for a moment, then exhale slowly through the mouth for 4-5 seconds. Repeat 3-5 times to calm the mind and body. Focus on Muscles: Start at the top of the body, such as the hands or head. Encourage the responder to tense the muscles, counting to 5 while breathing in. For example, raise your eyebrows and tense

your facial muscles. After counting, exhale and release the tension counting 4-5. Feel the difference between tension and relaxation. Proceed to the Next Body Part: Neck: Press and hold the neck muscles. Count to 5, then relax. Shoulders: Raise the shoulders to the ears, hold, then relax. Hands: Squeeze fists, hold, then release. Chest: Take a deep breath and expand the chest, hold, then exhale slowly. Abdomen: Pull in the abdominal muscles, hold, and release. Legs: Tense the leg muscles by lifting your toes, hold, and release. Finish with Breathing: After finishing all the body parts, do a few more deep breaths. Focus on the feeling of relaxation that spreads throughout the body. After a few minutes of focusing on the feeling of comfort, slowly open the eyes (if closed) and relax. Do this 3-4 times until the respondent feels relaxed. To make it easier for respondents to do so, a standard operating procedure (SOP) has been provided which can be used as a guide for implementing the action.

### **Data Analysis**

Univariate analysis in this study serves to describe the percentage and distribution of variables before being given progressive muscle relaxation therapy with after being given progressive muscle relaxation therapy. Each variable was analysed descriptively using frequency distribution. The data that has been collected is first tested for data normality with Kolmogorov -smirnov. Bivariate Analysis Bivariate analysis in this study was used to analyse the effect of progressive muscle relaxation therapy on changes in blood pressure in hypertensive patients using the T test statistical test with the help of computer applications at a significance level of 95% ( $\alpha = 0.05$ ) if the p value  $< \alpha = 0.05$  then there is an effect of the dose of progressive muscle relaxation therapy on changes in blood pressure in hypertensive patients as an effort to prevent hypertensive emergencies, whereas if the p value  $> \alpha = 0.05$  there is no effect of the dose of progressive muscle relaxation therapy on changes in blood pressure in hypertensive patients as an effort to prevent hypertensive emergencies.

## RESULTS

The results of this research were conducted on respondents by distributing questionnaires used to collect data, the data was collected and analysed, after the data was tested for normality with Kolmogorov-Smirnov, then the T test was carried out with the SPSS application, then a description of the respondents was obtained as follows:

**Table 1. Distribution of Respondent Characteristics**

Characteristics	Total	
	F	%
<b>Age Group</b>		
31-40 Years	4	6.06
41-50 Years	16	24.24
51-60 Years	15	22.72
≥61 Years	31	46.98
Total	66	100
<b>Gender</b>		
Male	24	36.37
Famale	42	63.63
Total	66	100
<b>Education</b>		
Elementary School	18	27.27
Junior High School	20	30.30
Senior High School	21	31.82
Higher Education	7	10.61
Total	66	100
<b>Work</b>		
Farmers	54	81.82
Self-Employed	5	7.58
Civil Servant	6	9.09
Housewife	1	1.51
Total	66	100

Based on the table above, the description of hypertension patients at Puskesmas Km 11, Siempat Nempu Hulu District shows that in the age group 31-40 years there were 4 respondents (6.06%), age 41-50 years as many as 16 respondents (24.24%), age 51-60 years as many as 15 respondents (22.72%), and age ≥ 61 years as many as 31 respondents (46.98%). From this data, it can be concluded that the majority of respondents were aged ≥ 61 years with 31 respondents (46.98%). In terms of gender, the majority of respondents were female as many as 42 respondents (63.63%), while men totalled 24 respondents (36.36%).

The educational characteristics of the respondents showed that 18 respondents (27.27%) had elementary school education, 20 respondents (30.30%) had junior high school education, 21 respondents (31.82%) had high school education, and 7 respondents (10.61%) had college education. Therefore, it can be concluded that the majority of respondents in this

study have a high school education, with 21 respondents (31.82%).

The employment characteristics of respondents based on the results showed that 54 respondents (81.82%) were farmers, 5 respondents (7.58%) were self-employed, 6 respondents (9.09%) were civil servants, and 1 respondent (1.51%) was a housewife. Thus, the majority of respondents worked as farmers, as many as 54 respondents (81.82%).

**Table 2. Differences in Blood Pressure Before and After Progressive Muscle Relaxation Intervention in hypertensive patients in the working area UPT Puskesmas KM.11**

Blood Pressure	Variable	N	Mean	Median	Std Deviasi	P value
Sistole	Before	66	168.94	167.00	8.666	< 0,001
	After		156.68	154.00	9.006	
Diastole	Before	66	102.53	100.00	4.272	< 0,001
	After		91.56	90.00	4.008	

Based on table 2, it is known that the average systole blood pressure before the progressive muscle relaxation intervention on respondents was 168.94 mmHg and after the intervention the average blood pressure of respondents was 156.68 mmHg with the results of the paired t test P value < 0.001 ( $p < 0.05$ ), while for diastole blood pressure before the intervention the average blood pressure was 102.53 mmHg and after the intervention 91.56 mmHg with the results of the paired t test P value < 0.001 ( $p < 0.05$ ).

**Table 3. Average Blood Pressure reduction after Progressive Muscle Relaxation Intervention in hypertensive patients in the working area UPT Puskesmas KM.11**

Blood Pressure	N	Mean	Std Deviasi	P Value
Systole	66	12,258	1,492	< 0,001
Diastole	66	10,970	1,754	< 0,001

Based on table 3, the average decrease in systole blood pressure is 12.258 with paired t test results P value < 0.001 ( $p < 0.05$ ) while for the average decrease in diastole blood pressure 10.970 with paired t test results P value < 0.001 ( $p < 0.05$ ).

## DISCUSSION

### Characteristics of Respondents

Based on the table above, the description of hypertension patients at Puskesmas Km 11, Siempat Nempu Hulu District shows that in the age group 31-40 years there were 4 respondents (6.06%), age 41-50 years as many as 16 respondents (24.24%), age 51-60 years as many as 15 respondents (22.72%), and age  $\geq 61$  years as many as 31 respondents (46.98%). From this data, it can be concluded that the majority of respondents were aged  $\geq 61$  years with 31 respondents (46.98%). As we age, the risk of developing hypertension also increases. This is due to the decreased elasticity of blood vessels that occurs in the elderly, leading to increased peripheral



vascular resistance. As a result, blood pressure tends to rise. This decrease in blood vessel elasticity leads to impaired blood flow, which in turn can increase the risk of hypertension and other vascular problems, such as stroke, which are often experienced by the elderly. (Wahyudi, A., & Pratiwi, 2021).

The majority of female gender were 42 respondents (72.72%) the minority of men were 24 respondents (36.36%). Women actually have excess protection against vascular disorders because they have the hormone estrogen which can protect vessels from damage, as they age these hormones will experience hormonal fluctuations, especially estrogen, which can cause changes in mood so that it can affect blood pressure. After menopause, the risk of hypertension increases in women. Women also often face higher psychosocial stress, which can affect cardiovascular health and blood pressure. The use of acetylcholine as a stimulant in the arm vein has been shown to decrease endothelial vasodilation linked to menopause, which impacts the role of endogenous estrogen in blood pressure regulation. Clinical evidence indicates that estrogen plays a role in regulating blood pressure responses to stress. When acetylcholine was used to stimulate endothelial function in the arm vein, it demonstrated reduced vasodilation associated with menopause, highlighting the influence of endogenous estrogen on blood pressure regulation. Additionally, clinical studies have shown that estrogen may regulate the blood pressure response to stress. (Setiawan, D. S., & Utami, 2021).

The characteristics of respondents' education show that 18 respondents (27.27%) have elementary school education, 20 respondents (30.30%) have junior high school education, 21 respondents (31.82%) have high school education, and 7 respondents (10.61%) have college education. Therefore, it can be concluded that the majority of respondents in this study have a high school education, with 21 respondents (31.82%). Higher levels of education often correlate with better knowledge about health. Highly educated individuals tend to be more aware of the importance of a healthy diet, exercise, and stress management, all of which can help prevent hypertension. (Wibowo, A. H., & Astuti, 2022)

The characteristics of respondents' occupations based on the results of the study were farmers as many as 54 respondents (81.82%), self-employed as many as 5 respondents (7.58%), civil servants as many as 6 respondents (9.09%), housewives 1 respondent (1.51). The majority of occupations are farmers as many as 54 respondents (81.82%). Jobs that are high in pressure and stress can contribute to an increased risk of hypertension. They assume that the work of the majority of farmers using limbs to work is part of exercise so they rarely do exercise and lack of time to relax so that it can affect overall health, including blood pressure. (Rahayu, P., & Wijayanti, 2022)

### **Difference in blood pressure before and after intervention**

Progressive muscle relaxation is a non-pharmacological therapy given to patients with a technique that combines deep breathing exercises and a series of muscle contractions and relaxations. The intervention was carried out to the respondents, with the results of the study based on the results known that the average systole blood pressure before the progressive muscle relaxation intervention on the respondents was 168.94 mmHg and after the intervention the average blood pressure of the respondents was 156.68 mmHg with the results of the paired t test  $P$  value  $< 0.001$  ( $p < 0.05$ ), while for diastole blood pressure before the intervention the average blood pressure was 102.53 mmHg and after the intervention 91.56 mmHg, the mean reduction in systolic blood pressure was 12.258 with paired t test results  $P$  value  $< 0.001$  ( $p < 0.05$ ) diastolic with a mean of 10.970 with paired t test results  $P$  value  $< 0.001$  ( $p < 0.05$ ).

Progressive muscle relaxation (PMR) techniques, as a non-pharmacological approach, can modify the body's physical and emotional reactions to stress by influencing the sympathetic nervous system. This system is responsible for activating the fight-or-flight response, which becomes more pronounced when a person is stressed or faces danger. PMR helps regulate this response by decreasing cortisol levels, the hormone linked to stress. Moreover, PMR can reduce blood pressure, metabolism, heart rate, and respiratory rate, all of which typically increase during stress. (Yunding, J., Megawaty, I., & Aulia, 2021).

Physiologically, the progressive muscle relaxation technique at each stage, especially during relaxation with deep breathing, allows for a greater supply of oxygen and helps to cleanse the respiration organs. It also improves blood circulation. By tensing and relaxing the muscles, this technique stimulates the parasympathetic nervous system, creating a calm state and reducing the 'fight or flight' response. In the stage of decreasing muscle tension, the technique directs the respondent's attention to feel the difference between muscle contraction and a relaxed state. This helps reduce the physical tension often associated with stress, anxiety or fear, which can lead to increased blood pressure. The process of relaxation improves blood flow by relaxing blood vessels, reducing vascular resistance and allowing blood to flow more easily. Techniques accompanied by deep breathing maximise oxygen intake, increase oxygenation in the body, and lower heart rate, which helps lower blood pressure. Progressive muscle relaxation can also increase awareness of tension in the body, helping individuals better recognise and manage stress responses more effectively.

The results of a study conducted showed that there was a significant difference in the mean systolic and diastolic blood pressure between before and after the Muscle Tension

Reduction (PMR) exercise intervention with a  $p$ -value = 0.000. In the group that received the intervention, there was a decrease in systolic blood pressure by 24.54 mmHg and diastolic blood pressure by 16.54 mmHg. PMR exercise has a significant impact in reducing blood pressure in patients with essential hypertension (primary hypertension). The effects of PMR therapy include both immediate and long-term impacts. The immediate effect of PMR is a reduction in blood pressure, particularly systolic pressure, in adults who undergo regular treatment. This study also reveals that PMR training can lower blood pressure not only in patients with essential or primary hypertension but also in those with secondary hypertension and other coexisting health conditions. (Wibowo, A. H., & Astuti, 2022).(Kurniawati, A. R., & Suryani, 2021).

Muscle Tension Reduction (PMR) training had an immediate effect, reducing pulse rate by 2.35 beats/min, systolic blood pressure by 5.44 mmHg, and diastolic blood pressure by 3.48 mmHg. After 4 weeks of PMR training, there were further reductions in pulse rate (2.9 beats/min), systolic blood pressure (5.1 mmHg), and diastolic blood pressure (3.1 mmHg). PMR significantly decreased patients' perception of stress and improved their perception of health. PMR is beneficial for patients with essential hypertension, and nurses can use it to improve their independent functioning and quality of life. (Indriani, L., & Pratiwi, 2022),(Setiawan, D. F., & Suryani, 2021).

Progressive muscle relaxation Shows that is effective there are significant differences in blood pressure in respondents both systole and diastole before and after PMR therapy. This is evidenced by the value of  $p = 0.000$  Progressive muscle relaxation therapy significantly lowers blood pressure The relaxed muscle state will spread the stimulus to the hypothalamus so that it will suppress the sympathetic nervous system so that there is a decrease in the production of epinephrine and norepinephrine hormones. The decrease in these hormones will cause a decrease in heart rate, the volume of the bladder will also decrease, and there is vasodilation of arterioles and venules. In addition, cardiac output, total peripheral resistance also decreases so that blood pressure will also drop. (Yuliana, E. S., & Suryani, 2020).

The same thing in research. progressive muscle relaxation is a method to help reduce tension so that the body's muscles become relaxed. Progressive muscle relaxation aims to reduce anxiety, stress, muscle tension, difficulty sleeping and lower blood pressure. When the body and mind are relaxed, automatically the tension that often makes the muscles tighten will be ignored. Muscle relaxation aims to decrease the sympathetic nervous system, increase parasympathetic activity, decrease metabolism, decrease blood pressure and pulse rate, and decrease oxygen consumption. (Potter, P. A., & Perry, 2019).

Progressive muscle relaxation has been shown to be effective in lowering blood pressure in patients with hypertension, with an average decrease in systolic blood pressure of 12.258 mmHg and diastolic blood pressure of 10.970 mmHg. average systolic blood pressure reduction of 12.258 with paired t test results  $P\text{ value} < 0.001$  ( $p < 0.05$ ) diastolic with an average of 10.970 with paired t test results  $P\text{ value} < 0.001$  ( $p < 0.05$ ). These findings are particularly important in the context of hypertension management and emergency prevention. Hypertension is a serious medical condition and has a high risk of causing emergencies, such as stroke and heart attack. Therefore, effective blood pressure management is essential to prevent these complications. Working Mechanism of Progressive Muscle Relaxation with Progressive muscle relaxation technique involves a systematic series of steps that focus on the tension and relaxation of specific muscle groups. The stages of progressive muscle relaxation are a systematic and structured method to reduce muscle tension and stress. This process consists of several important steps, at the time of the research conducted on patients visiting health services at the research location as respondents who met the criteria that contributed to lowering blood pressure, the following results of the intervention were carried out with several stages starting with an explanation of the actions and benefits of the Progressive Muscle Relaxation intervention, measuring blood pressure, the training session continued by carrying out the intervention for 20-30 minutes then evaluated by measuring blood pressure.

The first step in this technique is to take a deep breath. As the patient takes a breath, oxygen enters the body and is channelled throughout the system, including the muscles and organs. The increased supply of oxygen helps improve blood circulation, which provides a calming effect and prepares the body for the next stage.

The second step with Muscle Tensing, After inhaling, the patient is asked to tense a specific muscle group, such as the arm, shoulder, or leg muscles. Tensing the muscles for a few seconds allows the patient to feel the difference between tension and relaxation. This process provides awareness of tension that is often unconscious, helping individuals recognise parts of the body that are under stress.

The third step is to relax the muscles, After tensing the muscles, the patient then relaxes the muscles while exhaling slowly. This process causes the muscles to return to a normal state, reducing the tension that has been built up previously. As the muscles relax, there is a release of neurotransmitters that help lower stress and anxiety levels. When the muscles relax, there is a reduction in the activity of the sympathetic nervous system, which is responsible for the 'fight or flight' response and increases blood pressure. With reduced tension and activation of the

parasympathetic nervous system, blood pressure gradually decreases. This relaxation also helps to slow down the heart rate and expand the blood vessels, resulting in better blood flow.

Regularly applying these steps, at least 20-30 minutes daily, can have a long-term impact on blood pressure management. When patients consistently apply this technique, they may experience improved overall health and a reduced risk of hypertension-related emergencies.

By lowering blood pressure, progressive muscle relaxation can help prevent hypertensive crises and other emergencies. Better management of blood pressure can reduce the risk of long-term complications, as well as improve the quality of life of people with hypertension. so that respondents believe and believe these actions can reduce blood pressure in people with hypertension, then they can return to doing progressive muscle relaxation exercises in their daily lives.

Progressive muscle relaxation can lower pulse rate and blood pressure, as well as reduce sweating and respiratory frequency. One of the factors affecting systolic blood pressure is the psychological state; by engaging in relaxation, one can achieve calmness which contributes to a decrease in systolic pressure. In addition, systolic blood pressure is also affected by systemic and pulmonary circulation, so this therapy, combined with breathing regulation, can lower systolic blood pressure. Meanwhile, diastolic blood pressure is related to coronary circulation; if the coronary arteries are atherosclerotic, this may lead to an increase in diastolic pressure. Progressive muscle relaxation therapy can lead to a slight decrease in diastolic blood pressure. This process also enriches the blood with oxygen and cleanses the respiratory organs, which increases the vital capacity and oxidation of the lungs. In addition, while in a state of relaxation, the muscles stimulate the release of several positive hormones, such as endorphins, serotonin, and melatonin, which function as endogenous morphine (substances that provide a calming effect) as well as catecholamines, which facilitate blood flow. The relaxed state will physiologically stimulate the hypothalamus to secrete pituitary hormones that help to calm the mind and affect blood pressure lowering. (Wahyuni, R., & Setiawan, 2020).

The results of the research analysis (Andri., 2018) regarding Nursing Clinical Practice in Hypertensive Clients with Innovative Interventions of Progressive Muscle Relaxation Techniques show that hypertensive clients experience symptoms such as pain in the head to the nape of the neck, blurred vision, tension in the neck, weakness, rapid heart rate, and shortness of breath. An innovative intervention in the form of progressive muscle relaxation therapy was provided upon admission to the Hospital Emergency Department. The results showed a decrease in blood pressure in hypertensive patients, with an average decrease in

systolic by 23.3 mmHg and diastolic by 3.3 mmHg. This shows that progressive muscle relaxation therapy has a positive effect on reducing client blood pressure, both in terms of vital signs and the client's general condition.

The results of the research conducted by (Wibowo, 2017). showed that nursing analysis was carried out by providing progressive muscle relaxation therapy to respondents in the context of emergencies in patients with a diagnosis of hypertension who came to the Emergency Department. Based on the results of the analysis, it was concluded that the innovative intervention applied to three cases of patients with increased blood pressure and a history of hypertension succeeded in lowering blood pressure after the intervention with a two-hour interval. The researchers ensured that the patients did not receive any antihypertensive drugs either orally or by injection. The average reduction in blood pressure was recorded at 16.7 mmHg for systolic and 13.3 mmHg for diastolic. These results indicate the effect of progressive muscle relaxation therapy and Sundanese flute music therapy on reducing blood pressure in hypertensive patients.

In this case study found 2 patients who experienced hypertension urgency, patient 1 was admitted with a medical diagnosis of seizure observation, DM, and hypertension urgency. The patient was brought to the emergency room by his family with seizures and decreased consciousness. Based on the physical examination, it was found that the patient had the highest blood pressure of 220/110 mmHg with signs and symptoms of dizziness, blurred vision, headache, anxiety, insomnia, and pain in the back of the neck. At the time of transfer to hospitalization, the patient received a thoracic photo examination with the results of cardiomegaly in the heart. After the assessment and physical examination carried out on the patient, the nurse plans to intervene with progressive muscle relaxation therapy which hopes that the patient's blood pressure can be controlled. This progressive muscle relaxation therapy intervention was carried out for 2 consecutive days with a range of about 10-15 minutes so that the results obtained before the intervention the patient's blood pressure reached 161/101 mmHg, after the intervention the results were 140/90 mmHg, so progressive muscle relaxation therapy was effective for hypertensive patients. Progressive muscle relaxation therapy has been shown to be effective in lowering blood pressure in hypertensive patients. Through deep breathing exercises and gradual muscle relaxation, patients can experience a significant reduction in blood pressure. This technique helps patients manage stress effectively. Stress is a risk factor that can increase blood pressure, so controlling stress through this therapy can provide additional benefits for hypertensive patients. Progressive muscle relaxation therapy also increases awareness of body sensations. This can help patients to be more sensitive to

physiological changes associated with blood pressure, enabling them to respond more quickly with relaxation techniques when feeling symptoms of stress or tension (Priharini1 et al., 2024).

## CONCLUSIONS

Progressive Muscle Relaxation technique is one of the nursing interventions by applying to hypertensive patients proven to be effective in lowering blood pressure and can be used as an effort to prevent hypertension emergencies as a non-pharmacological therapy, progressive muscle relaxation can reduce the burden on the cardiovascular system, thus preventing dangerous spikes in blood pressure. Overall, the application of this technique has great potential in preventing serious complications associated with hypertension and improving patients' quality of life. especially when performed regularly and combined with other healthy lifestyle changes, such as a balanced diet, regular exercise, and medication adherence.

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