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THE EFFECT OF PROGRESSIVE MUSCLE RELAXATION ON BLOOD PRESSURE STABILITY IN HYPERTENSION PATIENTS

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ABSTRACT
Hypertension is a major global challenge, contributing to the burden of heart disease, stroke and kidney failure, as well as causing early death and disability. This study was to determine the effect of progressive muscle relaxation on blood pressure stability in hypertension patients. The method used was a quasi-experimental pre- and post-test group design without a control group. The sample was 35 hypertension patients using a consecutive sampling technique data analysis using the paired t-test. Participants were excluded if they were receiving other treatments for hypertension or had musculoskeletal conditions, such as joint diseases or fractures, while those who had a history of hypertension within the previous 12 months, were not taking antihypertensive medication, and were not undergoing any other therapeutic interventions were included. Participants were excluded if they were receiving other treatments for hypertension or had musculoskeletal conditions, such as joint diseases or fractures, while those who had a history of hypertension within the previous 12 months, were not taking antihypertensive medication, and were not undergoing any other therapeutic interventions were included. Based on the results of the bivariate analysis, it was found that there was an effect of progressive muscle relaxation on the stability of blood pressure in hypertension patients (P value = 0.000 <0.05). Conclusions: Progressive muscle relaxation can reduce tension in the body, and increase the relaxation response. When the body feels the relaxation response, it will slow down the heart rate so that pumping blood throughout the body becomes effective and blood pressure decreases.

Keywords: blood pressure; hypertension; progressive muscle relaxation

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INTRODUCTION

Hypertension is one of the main risk factors associated with the main cause of death in the elderly. Various efforts have been made but are still not optimal. This condition encourages the development of non-pharmacological therapy to complement pharmacological therapy, such as progressive muscle relaxation. Increasing proportion of elderly in the global population, multimorbidity has become a global health problem in society due to increased disability and mortality, decreased quality of life, and increased disease, such as cardiometabolic multimorbidity defined as the coexistence of two or more cardiometabolic diseases including hypertension, coronary heart disease (CHD), stroke, and diabetes, which is one of the most common and severe multimorbidities. Compared with patients without cardiometabolic disease, patients with cardiometabolic multimorbidity have a 3.7-6.9 times higher risk of all-cause mortality and a 12-15 year reduction in life expectancy at age 60 (Zhang et al., 2019) (Xie et al., 2022)

Approximately 1.28 billion persons between the ages of 30 and 79 globally suffer from hypertension, with the majority (two-thirds) residing in low- and middle-income nations. 46%

of persons with hypertension are thought to be ignorant about their disease. Just 42% of persons with hypertension receive a diagnosis and treatment.Of persons with hypertension, almost 1 in 5 (21%) have it under control. One of the leading causes of premature death in the globe is hypertension. The reduction of hypertension by 33% between 2010 and 2030 is one of the global goals for noncommunicable diseases (World Health Organization, 2021).

In Aceh, the prevalence of hypertension was recorded at 12.6% of the population of Aceh, which is 5,274,871 people (BPS). The results of a study by the Aceh provincial health office stated that hypertension ranks fourth as the most common disease suffered by the people of Aceh with 664,634 cases (Dinkes Aceh, 2021). Meanwhile, for hypertension sufferers in Pidie Jaya Regency from January to December 2021, there were 17,869 cases out of a total population of 159,829 people . Meanwhile, for the Trienggadeng Health Center Working Area, data on hypertension sufferers was obtained as many as 769 cases (Trienggadeng Health Center, 2022)According to the author's first interview with six elderly hypertension patients at the Trienggadeng Health Center Working Area of Pidie Jaya Regency, medication routines were frequently not followed on time, with forgetfulness being the primary culprit. Additionally, the researcher asked them questions on "muscle relaxation" in subsequent interviews, but their overall responses were in the category of not knowing because, up until now, they had only utilized hypertension medicine to stabilize blood pressure. Progressive muscle relaxation is one non-pharmacological technique that has never been used to treat hypertension in the elderly. Patients with hypertension have low levels of awareness, control, and therapy. Therefore, it is imperative to raise the patients' blood pressure control standards. Blood pressure control is also supported by exercise therapy and health education in addition to medication (Yue et al., 2022)

Hypertension is a major global challenge, contributing to the burden of heart disease, stroke and kidney failure, as well as causing early death and disability. Appropriate lifestyle modification is the cornerstone for the prevention and control of hypertension. In this regard, lack of knowledge and poor attitudes towards lifestyle modification have become major problems. Factors that contribute to hypertension are mainly environmental, genetic and behavioral factors such as smoking, high alcohol intake and high fat intake, and these risk factors can be counteracted through lifestyle modification, According, to WHO, the increasing prevalence of hypertension and other cardiovascular diseases in developing countries is associated with an increasing aging population, urbanization and socio-economic changes favoring sedentary habits. Hypertension can be adequately managed through medication and lifestyle changes. In addition to lowering blood pressure, it can also reduce other cardiovascular risk factors (Bogale et al., 2020).

Hypertension is still a dangerous health problem in the elderly, because it has an impact on other complications such as increased heart workload, stroke and kidney failure, and causes premature death and disability. Many factors cause hypertension, one of which is a poor lifestyle factor. Appropriate lifestyle modification is the basis for preventing and controlling hypertension (Hijriana et al., 2022).Hypertension affects about one-third of the adult population worldwide and is a major cause of premature death despite advances in pharmacological treatment. Epidemiological studies have shown that preventive and antihypertensive factors include lifestyle interventions (regular physical exercise, weight management, and healthy diet), as well as other recommendations such as stress management and adequate sleep patterns. The physiological mechanisms underlying the beneficial effects of these lifestyle interventions on hypertension include not only prevention of risk factors such as obesity and insulin resistance) and improvement of vascular health through

improvement of redox and inflammatory status, but also reduction of sympathetic overactivation and non-traditional mechanisms such as increased myokine secretion (Valenzuela et al., 2021).

Various environmental factors, including dietary components, physical activity, and alcohol consumption, can affect blood pressure. Many dietary components have been associated with hypertension, Some other factors include overweight and obesity, excess sodium intake, and inadequate intake of potassium, calcium, magnesium, protein (especially from vegetables), fiber, and fish oil. Poor diet, physical inactivity, and excess alcohol intake are major causes of hypertension. Physical activity has been associated with a reduced risk of incident hypertension, fitness reduces the rate of increase in systolic blood pressure over time and delays the onset of hypertension, Genetic influences, Hypertension is a complex polygenic disorder in which many genes or combinations of genes influence blood pressure. Untreated hypertension can result in the risk of vascular complications (Reboussin et al., 2018).Non-pharmacologic therapy, such as progressive muscle relaxation is a type of nursing intervention used to decrease blood pressure. Many studies have explained the effect of progressive muscle relaxation on blood pressure, progressive muscle relaxation have been found to decrease blood pressure, especially in older adults. Therefore, researchers use progressive muscle relaxation that can be done by the elderly without being burdensome as a research intervention to reduce blood pressure in the elderly with hypertension. This study was to determine the effect of progressive muscle relaxation on blood pressure stability in hypertension patients.

METHOD

The quantitative research design used to determine the quasi-experimental pre- and post-test design without a control group. The design aimed to determine the effect of actions on desired outcomes in the intervention group.

Population and Sample

This research was conducted in the working area of Trienggadeng Health Center, Pidie Jaya Regency. The sample was all elderly suffering from hypertension. The sample size was determined from the sample to mean in the previous studies; it was found that the level of significance (α): 0.5; effect size: 0.70; and power: 0.80. The sample in this study amounted to 33 to prevent drop out then added 10% so that the sample became 35 respondents for intervention without a control group. Participants were excluded if they were receiving other treatments for hypertension or had musculoskeletal conditions, such as joint diseases or fractures, while those who had a history of hypertension within the previous 12 months, were not taking antihypertensive medication, and were not undergoing any other therapeutic interventions were included.Participants were excluded if they were receiving other treatments for hypertension or had musculoskeletal conditions, such as joint diseases or fractures, while those who had a history of hypertension within the previous 12 months, were not taking antihypertensive medication, and were not undergoing any other therapeutic interventions were included.

Instrument

The instrument used is an observation sheet to find out how changes in blood pressure before and after therapy are given. instrument used was a sphygnomanometer to measure blood pressure. The exercise was performed actively once every day for 4 weeks.

Data Analysis

In the study using the Paired T-test, $p < 0.00$, which was less than $\alpha = 0.05$ so that it could be concluded that there were differences in Blood Pleasure before and after application of relaxation techniques.

Ethical Statement

The ethics committee of the Trienggadeng Community Health Center, Pidie Jaya Regency, approved this research after going through an ethical test. This research is considered ethically appropriate. Before the research was conducted, respondents were first given an explanation about the intervention that would be given. If the respondents agreed, they would then be given informed consent.

RESULT

Characteristics of Respondent

Respondent characteristics, such as gender, age, and type of occupation, are taken into account in the study. Table 1 below demonstrates that data was obtained from 35 patients at the Trienggadeng Community Health Center working area, Pidie Jaya Regency. Of these patients, 21 (60.0%) were female, age were elderly (40 %), and the majority of these patients worked as housewives or self-employed were 10 respondent (28,6).

Table 1.
Characteristic Respondents

Characteristics	f	%
Gender		
Female	21	60,0
Male	14	40,0
Age (Years)		
Adult (19-44)	9	25,7
Ealy Elder (46-59)	12	34,3
Elderly (>=60)	14	40,0
Type of occupation		
Housewife	10	28,6
Farmer	8	22,9
Self Employe	11	31,4
Civil Servant	3	8,6
Retire Civil Servant	3	8,6

Risk factors for high blood pressure (hypertension) include old age, family history, obesity, high salt intake, and unhealthy lifestyle habits such as smoking and alcohol consumption. As people age, the risk of hypertension increases due to changes in the arteries, such as thickening and stiffening, which narrows blood vessels. Obesity, lack of exercise, and poor diet (high in fat and salt) also contribute to high blood pressure. In general, the older a person is, the higher their risk of developing hypertension (Fuchs & Whelton, 2020) (Patenrengi, 2020).

Males are more likely than women to develop hypertension early in life, and males between the ages of 30 and 40 are particularly at risk because of their higher baseline blood pressure levels and the effects of testosterone, which can raise blood vessel tone and blood pressure. Younger males are more likely to have hypertension, which is frequently linked to lifestyle choices including smoking, drinking, and being more likely to be obese (Khawaja et al., 2020). In comparison with men of the same age, the hormone estrogen lowers blood pressure in premenopausal women. In addition to promoting blood vessel relaxation, estrogen also controls the body's salt balance. Therefore, compared to men of the same age, women of

reproductive age typically have a lower incidence of hypertension (Chrysafides & Prisant, 2018).

Blood pressure before Intervention

The distribution of the frequency of the hypertension category in the respondents can be seen that before the progressive muscle relaxation was carried out, the respondents who experienced hypertension with the category of hypertension stage 1 or mild hypertension were 16 people [45.7 %] and respondents with the category of hypertension stage 2 or moderate hypertension were 19 people [54,3%].

Tabel 2.
Distribution of the Frequency Before Progressive Muscle Relaxation Intervention

Blood Pressure Pre Test	f	%
Hypertension Stage 1	16	45,7
Hypertension Stage 2	19	54,3

Blood pressure After Intervention

Frequency distribution of the respondent's hypertension category in the post-test showed that most of the respondents who experienced hypertension in the high normal category were 15 people [42.9%], respondents with the category of pre hypertension were 10 people (28,6 %), respondents with stage 1 category [mild hypertension] were 9 people [25.7%] and respondents with the category of hypertension stage 2 or moderate hypertension were 1 people [2,9%].

Tabel 3.
Distribution of the Frequency After Progressive Muscle Relaxation Intervention

Blood Pressure Post Test	f	%
Normal	15	42,9
Pre Hypertension	10	28,6
Hypertension Stage 1	9	25,7
Hypertension Stage 2	1	2,9

The difference in Blood Pressure before and after Intervention

The Paired T-test results of the analysis showed a p-value of 0.00 show differences in blood pressure values before and after progressive muscle relaxation in the elderly with hypertension. Based on the results above, there is a statistically significant effect between exercise and blood pressure conditions in the elderly.

Table 4.
The difference in Blood Pressure before and after Progresive Muscle Relaxation Intervention

Blood Pressure	Means	*SD*	*p-value*
Pre test			
Systolic	156,57 mmHg	11,36	0.00
Diastolic	90,14 mmHg	6,38	
Post Test			
Systolic	131,00 mmHg	11,69	0.00
Diastolic	82,86 mmHg	5,04	

PMR has been repeatedly shown to significantly decrease both systolic and diastolic blood pressure. Following a 6-week daily PMR intervention, participants' average systolic blood pressure decreased by 5–10 mmHg, while their diastolic blood pressure decreased by roughly 4–7 mmHg (Saper, R. B., Sherman, K. J., & Kaptchuk, 2017). This study supports the

findings of Nolan et al. (T et al., 2020), who discovered that short-term therapies, such four weeks of 20-minute PMR sessions, significantly reduced blood pressure, particularly in patients with mild to severe hypertension. The ability of PMR to increase parasympathetic (relaxation) activity and decrease sympathetic nervous system activity is the main physiological mechanism underlying this reduction. This change in autonomic balance decreases blood pressure by encouraging vasodilation and lowering heart rate. By decreasing stress hormones such as cortisol, PMR lessens the physiological reactions that usually cause blood pressure to rise.

DISCUSSION

Progressive muscle relaxation is a non-pharmacological intervention that is effective in reducing tension caused by chronic disease, psychological tension, anxiety, social function, depression, and pain. This technique has always been considered one of the best complementary methods, given its simplicity and cost effectiveness. In progressive muscle relaxation, the person feels increasingly relaxed through active contractions followed by relaxation of certain muscle groups, which causes increased blood flow and improved function of the organ's blood supply. A significant relationship was observed between reduction of stress and muscle tension with reduction of anxiety and depression. Additionally, this technique increases the sense of self-control. Research conducted in Iran demonstrated the role of progressive muscle relaxation in reducing depression in cancer patients,depression in primiparous women, and improving quality of life in elderly people (Ahmad et al., 2019)

Progressive muscle relaxation therapy increases brain signals that induce muscles to relax and blood flow to the brain by stimulating the release of endorphins and encephalon substances . Numerous studies, including one that found a reduction in anxiety and depression along with an increase in relaxation skills and the capacity to understand the lives of cancer patients who received progressive muscle relaxation therapy, have demonstrated the efficacy of this treatment. Progressive muscular relaxation was found to help patients relax more and lessen anxiety over the course of three days. These research' findings support the notion that treating anxiety disorders using progressive muscle relaxation therapy is a viable treatment option (Syisnawati et al., 2022).Icel and Basoqul's study on the impact of music therapy and progressive muscle relaxation training on the quality of sleep and anger levels in chronic mental patients reveals that there was a statistically significant change ($p \leq .001$) between the intervention group's pre- and post-test mean scores. Following the intervention, a statistically significant difference was observed between the two groups' scores on the PSQI, trait anger scale, anger-in, anger-out, and anger-control ($p \leq .001$). For chronic mental patients, music therapy and relaxation training are useful for reducing rage and improving sleep quality (İçel & Başoğul, 2021).

PMR Intervention can lead to significant improvements in sleep quality after the intervention compared with patients in the control group. In studies conducted with various groups of patients in the literature, it was found that PMR exercises improved the sleep quality of patients (Kılıç & Parlar Kılıç, 2021), (Bagheri et al., 2021), It was also found that nurses can train patients about PMR exercises and encourage them to learn these easy and economical exercises (Bahçeli & Karabulut, 2021). PMR Intervention prevents the unwanted side effects of stress and anxiety by balancing the activity of the posterior and anterior hypothalamus (Toussaint et al., 2021). This exercise has many benefits in terms of improving physical and mental condition by reducing the effects of stress and anxiety, shifting attention to something other than pain, reducing fatigue, and facilitating sleep. This characteristic of PMR exercise is considered effective in improving sleep quality.

PMR exercise significantly improves the severity of depressive symptoms, sleep, and quality of life in epilepsy patients. As a result, the muscle contraction release technique of PMR exercise reduces overall muscle tension and effectively increases overall physiological relaxation, which is potentially associated with increased PMR parasympathetic activity. The physiological benefits of PMR include increased heart rate, cortisol, and blood pressure as well as pain relief, while the psychological benefits include relief of stress and anxiety, and can improve sleep quality and quality of life of sufferers (Simon et al., 2022) (Talo & Turan, 2023).The goal of hypertension exercise is to increase oxygen and blood flow to the skeleton and active muscles, especially the heart muscle. Exercise or gymnastics can raise blood pressure by increasing the amount of oxygen in the cells, which increases heart rate, cardiac output, stroke volume, and energy generation. Exercise causes the blood vessels to expand, which causes the blood flow to rapidly drop. After 30 to 120 minutes, the blood pressure returns to what it was before the exercise. Regular and consistent exercise will make the drop in blood pressure more elastic. Exercise causes blood vessels to relax, which lowers blood pressure . This is the process by which blood pressure is lowered after exercise (Harmilah et al., 2021).

CONCLUSION

Progressive muscle relaxation is a non-pharmacological intervention that is effective in reducing tension caused by chronic disease, psychological tension, anxiety, social function, depression, and pain. This technique has always been considered one of the best complementary methods, given its simplicity and cost effectiveness. In progressive muscle relaxation, the person feels increasingly relaxed through active contractions followed by relaxation of certain muscle groups, which causes increased blood flow and improved function of the organ's blood supply. Although this study shows that progressive muscle relaxation (PMR) improves blood pressure stability in hypertensive individuals right away, more research is required to assess the long-term consequences. Future research should examine if consistent PMR practice can result in long-lasting improvements in blood pressure management over the course of several months or years. Future research could benefit from comparative studies between progressive muscle relaxation and other relaxation techniques, such as deep breathing exercises, meditation, or yoga, to determine which is most effective in managing hypertension. A meta-analysis of these approaches could offer clearer guidance for clinical practice.

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