

## Research Article

# The Effect of Progressive Muscle Relaxation (PMR) Exercise on Blood Pressure Reduction in Hypertensive Clients: A Literature Review

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**Abstract.**

Compliance with taking antihypertensive drugs is low amongst patients with hypertension. Uncontrolled blood pressure causes heart disease, kidney failure, diabetes, and stroke. It is necessary to have alternative support in controlling blood pressure by using progressive muscle relaxation exercises. This study aimed to determine the effect of progressive muscle relaxation on reducing blood pressure in patients with hypertension. The research design used was a literature study with a sample size of 20 journals: Pubmed (n=2), Proquest (n=4), Science Direct (n=8) and Biomed Central (n=6). By using the keyword search data “Progressive Muscle Relaxation AND Blood Pressure AND Hypertension OR Hypertensive” and using analysis techniques with thematic analysis, 95% of the results of the study reported that there was a decrease in systolic and diastolic values in hypertensive patients before and after the progressive muscle relaxation intervention and 5% reported that there was no change. Progressive muscle relaxation is effective for lowering blood pressure in hypertensive patients.

**Keywords:** Progressive Muscle Relaxation, Blood Pressure, Hypertension

## 1. INTRODUCTION

Hypertension is the main cause of heart disease and death in the globe. (1). Global mean blood pressure (BP) has remained constant or reduced somewhat during the last four decades due to widespread usage of antihypertensive drugs (2). By contrast, the prevalence of hypertension has increased, especially in low- and middle-income countries (LMICs) (3).

Judging from the data on adherence to taking antihypertensive drugs, 32.3% did not regularly take hypertension medicine and 13.3% refused to take medicine. The reasons for the client not taking medicine include feeling healed 59.8%, not regularly going to

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health facilities 31.3%, taking herbal medicine 14.5%, often forgetting 11.5%, unable to buy medicine 8, 1%, unable to feel side effects 4.5%, and unavailability of drugs in health services 2.0%, others 12.5% (4).

Identify some of these reasons, therefore it is necessary to have alternative treatments that can support blood pressure control, in order to prevent complications. Treatment of hypertension is divided into two, namely pharmacological treatment using antihypertensive drugs such as diuretics, beta-blockers, ACE inhibitors, angiotensin II receptor blockers (ARBs), Angiotensin II receptor blockers (ARBs), calcium channel blockers (CCBs) alpha-blockers, clonidine, and vasodilators. Pharmacological treatment can cause side effects such as dizziness, drowsiness, cough, fatigue, increased urinary frequency. Reduces concentration and sexual dysfunction if consumed in the long term. This is what causes scientists to develop non-pharmacological therapies(5).

Non-pharmacological therapy can cause a relaxing effect on the body that can reduce sodium levels in the blood, so that blood pressure is controlled (6). In addition, it can be done independently and does not cost much and does not cause long-term impacts. Many non-pharmacological therapies have been developed abroad as complementary therapies to conventional medicine. Some therapies are grouped in Complementary Alternative Medicine (CAM) which consists of Alternative Medical System, Mind Body Intervention, Biological Based Therapy, Manipulative Body-Based Method and Energy Therapy (7).

Non-pharmacological therapy or known as complementary therapy is a traditional medicine that is complementary to conventional medicine. Complementary therapies that have been found and used to lower blood pressure include using herbal plants, acupuncture therapy, aromatherapy, meditation therapy, yoga, dance therapy, music therapy (8). In addition, there are several therapies that are believed to lower blood pressure, such as laughter therapy and progressive muscle relaxation therapy (5).

Progressive muscle relaxation therapy is a therapy that focuses on muscle activity so that muscles relax and can reduce muscle tension (9). Progressive muscle relaxation is a systematic technique carried out to achieve a relaxed state by performing movements to tense and loosen tense muscles so that muscles relax and reduce stress levels and lower blood pressure (10). Relaxation exercises are useful to help reduce tense muscles, lower blood pressure, help increase tolerance during activities, increase immunity so that functional status and quality of life improve (11).

The advantage of progressive muscle relaxation when compared to other therapies is that it does not require imagination, strength or suggestions such as laughter therapy, aromatherapy, meditation therapy, yoga and music therapy. Progressive muscle

relaxation focuses on muscle activity by identifying tense muscles in a relaxed state by reducing muscle tension by performing relaxation techniques. Relaxation therapy can also reduce peripheral resistance, increase the elasticity of blood vessels, muscles and blood circulation throughout the body so that it can facilitate the process of circulating and taking oxygen. In addition, relaxation can widen blood vessels directly thereby lowering blood pressure (5).

This study aims to determine the effect of progressive muscle relaxation intervention on reducing blood pressure in hypertensive patients based on a literature study. The benefit of this research is that it can provide an evidence-based view of nursing interventions.

## 2. METHODS

The type of research used in this study is literature study research (literature review). This study aims to analyze the progressive muscle relaxation intervention as an independent variable that can increase the dependent variable, namely a decrease in blood pressure. Journal portal websites used by researchers in conducting data searches are Pubmed, Proquest Science Direct, and Biomed Central. The keywords used are "progressive muscle relaxation and blood pressure and hypertension or hypertensive". Inclusion criteria of journals were accessed, including: (1) international journals related to progressive muscle relaxation interventions to reduce blood pressure in hypertensive patients; (2) International journals published in 2011-2020; (3) English-language international journals; (4) Journals that can be accessed in full text. Journal quality assessment found using JBI (Joanna Briggs Institute). Journal data analysis using thematic analysis method.

## 3. RESULTS AND DISCUSSION

search for journal data from 4 international web portals, namely *Pubmed*, *Proquest*, *Science Direct*, and *Biomed Central*. the keywords used are Progressive Muscle Relaxation, Hypertension, Hypertensive, Blood Pressure and modify with Boolean operators (AND and OR) for the specification of the findings of the journal. Based on the search, we found 21 articles from Pubmed, 49,642 articles from Proquest, 149,050 articles from Science Direct, 649 articles from Biomed Central. Furthermore, screening is carried out with the following inclusion criteria (a) Journals published within a period of 10 years from 2011 – 2020, (b) fully accessible journals (full text), (c) Journal type (quasi-experimental

design), (d) English and Indonesian Journals. Then adjust to the PICO analysis method and the researchers screened the journals by reading one by one the journals related to the research topic. After the screening process is carried out, a quality test process is carried out using JBI tools such as Quasi-Experimental Studies so as to get quality journals and obtain journals that are used as literature in this research.

It was obtained about 17 international and local journals related to hypertension variables, there are 8 international journals and 9 local journals that discuss the effect of progressive muscle relaxation on reducing blood pressure in patients with hypertension. Based on Figure ??1 (journal database) obtained journals from Pubmed (n=1), Proquest (n=4), Science Direct (n=7), and Biomed Central (n=5) sites.

Based on the thematic results of the analysis, it was found that there were two major themes found in the journal, namely, (1) The Effect of Progressive Muscle Relaxation on Blood Pressure in Patients with Hypertension and (2) the Progressive Muscle Relaxation Method used in the study.

### **3.1. Effect of Progressive Muscle Relaxation on Blood Pressure in Hypertensive Patients**

Progressive muscle relaxation is a complementary therapy that has many benefits, one of which can lower blood pressure by focusing on relaxation activities that cause muscles to feel relaxed, this relaxed feeling can later affect the work process of the sympathetic and parasympathetic Nerve (Swing & Alie, 2016). In the research from Rahmawati et al., 2018, also mentioned that the movement in PMR causes the body to feel more relaxed so that it can inhibit the increase in sympathetic nerves and slow down the body's work so that there is a decrease in heart rate, breathing rhythm, blood pressure, muscle tension, and body metabolism.

according to (14) mentions that when the body is relaxed and calm, the body will automatically ignore tension so that it can affect hormone production in the parasympathetic nervous system. Relaxation will reduce the production of the hormone's epinephrine and cortisol where decreased cortisol will affect the work of the heart by reducing cardiac output. In addition, the parasympathetics secrete acetylcholine which can affect the work of the heart so that blood vessels will experience vasodilation and cause blood circulation to be smooth so that blood pressure decreases.

Statements in research (15) which states that progressive muscle relaxation can reduce blood pressure, anxiety, stress, muscle tension and difficulty sleeping. When the body is relaxed, the hypothalamus will automatically adjust and decrease the activity

of the sympathetic and parasympathetic nervous systems. Sympathetic nerves have a function to stimulate or stimulate body organs such as increasing heart and breathing rates and constricting central blood vessels. While the parasympathetic nerves work to stimulate the increase in the function of organs that are derived by the sympathetic nerves.

Progressive muscle relaxation exercises can automatically stimulate the sympathetic nervous system so that it can reduce levels of catecholamine substances where these substances can cause constriction of blood vessels which can increase blood pressure. When activity in the sympathetic nerves decreases due to the effects of progressive muscle relaxation, the production of catecholamines decreases so that it can have an effect on lowering blood pressure (16).

Based on research (15) states that when the body performs progressive muscle relaxation in a calm and concentrated state for 15-30 minutes, the secretion of CRH (Corticotropin Releasing Hormone) and ACTH (Adrenocorticotrophic Hormone) in the hypothalamus decreases. The decrease in secretion of these two hormones can result in decreased sympathetic nerve activity, so that the release of adrenaline and non-epinephrine results in a decrease in heart rate, reduced blood vessel resistance, dilation of blood vessels and a decrease in heart pumping throughout the body so that blood pressure in the arteries of the heart decreases. .

Heart valves that experience stiffness during progressive muscle relaxation will cause the heart valves to not close properly and the flow of blood circulating throughout the body is obstructed. Therefore, it causes the activity of the heart to pump blood harder which causes high diastolic blood pressure (17). The statement is in accordance with the research results (18) who stated that hypertension appeared between the ages of 30-50 years and the incidence increased at the age of 50-60 years rather than the age of 50-60. Along with increasing age can cause systolic blood pressure to increase due to a decrease in the elasticity of blood vessels.

Progressive muscle relaxation produces a significant impact in reducing systolic and diastolic blood pressure in patients with hypertension, this is evident from the results of research (19) that doing PMR exercises regularly and in accordance with the guidelines, namely doing relaxation 2 times a day, in the morning and evening for 5 days, shows that there is a greater decrease in blood pressure, namely 10-20 mmHg.

Progressive muscle relaxation carried out in a row can cause an increase in parasympathetic nerves, this is in line with the statement (Rahayu et al., 2020) which states that it can cause an increase in sympathetic nerve activity so that the neurotransmitter acetylcholine will be released, and that acetylcholine affects the activity of skeletal

and smooth muscles in the peripheral nervous system. The released acetylcholine neurotransmitter will stimulate endothelium cells in vessels so as to synthesize NO (Nitric Oxide) which provides a signal to smooth muscle cells to relax so that the contraction of the heart muscle decreases then arteriolar and venous vasodilation occurs so that blood pressure decreases.

### 3.2. Progressive Muscle Relaxation Method used in the study.

In research journals used as literature, according to (21) The procedure for progressive muscle relaxation is to inhale and stretch the muscles for 4-10 seconds, then exhale and relax and relax for 10-20 seconds before contracting the muscles again to continue the next series of movements. Progressive muscle relaxation where the intervention is carried out by performing several predetermined movements that aim to stretch the muscles so as to lower blood pressure.(22) in his research journal states that progressive muscle relaxation therapy focuses on muscle activity by identifying tense muscles so that it reduces tension by performing progressive muscle relaxation techniques to reduce anxiety, pain and blood pressure.

## 4. CONCLUSION

Progressive muscle relaxation is a complementary therapy that has many benefits, one of which can lower blood pressure by focusing on relaxation activities that cause muscles to feel relaxed, this relaxed feeling can affect the work process of the sympathetic and parasympathetic nerves. Relaxation will reduce the production of the hormone's epinephrine and cortisol where decreased cortisol will affect the work of the heart by reducing cardiac output. In addition, the parasympathetics secrete acetylcholine which can affect the work of the heart so that blood vessels will experience vasodilation and cause blood circulation to be smooth so that blood pressure decreases.

Based on the results of the literature study, it was found that progressive muscle relaxation is effective for lowering blood pressure, this is caused by a decrease in the secretion of Corticotropin Releasing Hormone (CRH) and Adrenocorticotrophic Hormone (ACTH) in the hypothalamus which can result in decreased work activity on the sympathetic nerves resulting in the release of adrenaline. and noradrenaline so that blood vessels dilate, heart rate decreases, decreases resistance in blood vessels and decreases heart pump so that arterial blood in the heart decreases.

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## References

- [1] GBD 2017 Causes of Death Collaborators GA et al. Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet*. 2018 Nov;392(10159):1736–88.
- [2] Mills KT, Stefanescu A, He J. The global epidemiology of hypertension. *Nat Rev Nephrol*. 2020 Apr;16(4):223–37.
- [3] Mills KT, Bundy JD, Kelly TN, Reed JE, Kearney PM, Reynolds K, et al. Global Disparities of Hypertension Prevalence and Control: A Systematic Analysis of Population-Based Studies From 90 Countries. *Circulation*. 2016 Aug;134(6):441–50.
- [4] Riskesdas K. Hasil Utama Riset Kesehata Dasar (RISKESDAS). *J Phys A Math Theor*. 2018;44(8):1–200.
- [5] Dimas Vironika. Relaksasi Otot Progresif Dan Terapi Tertawa Untuk Menurunkan Tekanan Darah Hipertensi Di Dusun Mejing Lor Ambarketawang Gamping Sleman Yogyakarta. 2016;1–16.
- [6] Ulfa Azhar M, Islam Negeri Aluddin Makassar U, Penulis K. The Indonesian Journal of Health Promotion Open Access Terapi Non Farmakologi dalam Pengendalian Tekanan Darah Pada Pasien Hipertensi: Systematic Review Non Pharmacological Therapy in Blood Pressure Control in Hypertensive Patients: Systematic Review. *Mppki*. 2019;2(3):192–9.
- [7] Maiwandira R. Perbandingan Pengaruh Terapi Relaksasi Otot Progresif Dan Terapi Relaksasi Meditasi Terhadap Penurunan Tekanan Darah Klien Hipertensi Di Wilayah Kerja Puskesmas Andalas. 2014;9(1):76–99.
- [8] Putri ME, Nurfitriani N. Terapi Hipertensi di rumah dengan terapi komplementer. *J Abdimas Kesehat*. 2020;2(1):59.
- [9] Damanik H, Ziraluo AA. Pengaruh Teknik Relaksasi Otot Progresif Terhadap Penurunan Tekanan Darah Pada Pasien Hipertensi Di Rsu Imelda. *J Keperawatan Prior*. 2018;1(2):96–104.
- [10] Ekarini NL, Heryati H, Maryam RS. Pengaruh Terapi Relaksasi Otot Progresif terhadap Respon Fisiologis Pasien Hipertensi. *J Kesehat*. 2019;10(1):47.

- [11] Sri Suwarni EW. Penerapan Teknik Relaksasi Otot Progresif Terhadap Tekanan Darah Pada Lansia Dengan Hipertensi Di Posyandu Kelurahan Muktiharjo Kidul Wilayah Kerja Puskesmas Tlogosari Kulon Kota Semarang. *J Chem Inf Model*. 2017;110(9):1689–99.
- [12] Ayunani SA, Alie Y. Pengaruh Latihan Relaksasi Otot Progresif Terhadap Tekanan Darah Pada Lanjut Usia [Scientific J Nursing]. *J Ilm Keperawatan*. 2016;2(1):51–6.
- [13] Rahmawati PM, M M, Deviantony F. M M, Deviantony F. Efektifitas Progressive Muscle Relaxation (Pmr) Terhadap Penurunan Tekanan Darah Pada Penderita Hipertensi. *Indones J Heal Sci*. 2018;(September):188.
- [14] Fadli. Pengaruh relaksasi otot progresif terhadap perubahan tekanan darah pada pasien hipertensi. *J Keperawatan*. 2018;12:249–53.
- [15] Baharuddin R. Pengaruh Relaksasi Otot Progresif Terhadap Tekanan Darah Pada Klien Hipertensi Primer. 2016;IV:82–9.
- [16] Alimansur M, Anwar MC. Efek Relaksasi Terhadap Penurunan Tekanan Darah Pada Penderita Hipertensi. *J Ilmu Kesehat*. 2017;2(1):74.
- [17] Herawati I, Azizah SN. Effect of Progressive Muscle Relaxation Exercise To Decrease Blood Pressure for. *Int Conf Heal Well-Being*; 2016. pp. 405–12.
- [18] Tyani UH. Efektifitas Relaksasi Otot Progresif Terhadap Tekanan Darah pada Penderita Hipertensi Esensial. *Cybrarians J*. 2015;2(37):1–31.
- [19] Misbah SR, Dali A, Prio AZ, Nurmiaty A. Dali, Prio AZ, Nurmiaty. The effect of progressive muscle relaxation technique on decreasing blood pressure among elderly in Kendari city. *Indian J Public Health Res Dev*. 2019;10(12):1994–9.
- [20] Rahayu sri mulyati, Hayati NI, Asih SL. Pengaruh Teknik Relaksasi Otot Progresif Terhadap Tekanan Darah Pada Lansia Dengan Hipertensi. *J media karya Kesehat*. 2020;3(1):91–8.
- [21] Naufal. Pengaruh Terapi Relaksasi Otot Progresif terhadap Tekanan Darah pada Wanita Lanjut Usia dengan Hipertensi. *J Kesehat*. 2020;21(1):1–9.
- [22] Ilham M, Armina A, Kadri H. Efektivitas Terapi Relaksasi Otot Progresif Dalam Menurunkan Hipertensi Pada Lansia. *J Akad Baiturrahim Jambi*. 2019;8(1):58.