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Original Research

Analysis of the Application of Deep Breathing Relaxation Techniques in Reducing Blood Pressure in Hypertension Patients

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Abstract

Background: Untreated hypertension will cause various cardiovascular problems. The hypertension treatment can be done using two methods, namely pharmacological and non-pharmacological. One way of non-pharmacological management is deep breathing relaxation therapy which focuses on breathing activity.
Objective: This paper aims to see an analysis of the application of deep breathing relaxation to changes in blood pressure in hypertensive patients based on empirical studies in the last ten years
Methods: The design of this research is a literature review of five journals that match the topic using the PICO framework method. The secondary data were taken from the Google Scholar database over the last ten years using an experimental design.
Results: The results show that deep breathing relaxation techniques influence reducing blood pressure in hypertensive patients. Deep breathing relaxation is very effective and easy for hypertension sufferers to decrease blood pressure.
Conclusion: Deep breathing relaxation is effective as a non-pharmacological therapy to reduce blood pressure in hypertensive patients.
Keywords: Deep Breath Relaxation; Hypertension; Lowering Blood Pressure

Introduction

Hypertension, or high blood pressure, is defined as systolic pressure > 140 mmHg and diastolic pressure > 90 mmHg obtained from two consecutive measurements to confirm the diagnosis of hypertension (Kamelia, Ariyani, & Rudiyanto, 2021). This condition is often called the “silent killer” because it does not cause symptoms yet can lead to sudden death (World Heart Federation, 2024). According to a 2023 WHO report, an estimated 1.28 billion people aged 30–79 worldwide have hypertension, and only 21% have their condition under control (World Heart Federation, 2024).

The prevalence of hypertension in Indonesia continues to rise. The 2018 Riskesdas reported a national prevalence of 34.1% among those aged ≥ 18 years, ranging from 13.2% in the 18–24 age group to 69.5% in those ≥ 75 years. The highest prevalence was found in East Kalimantan (39.8%), while in Aceh, the prevalence was 31.3% in men and 36.9% in women. Data from the Ministry of Health in 2015 also showed a prevalence of 32% among those aged > 25 years (Dewiyulian, 2024). According to Widiyanto (2020), the risk of hypertension increases significantly after the age of 45. This is supported by evidence that aging causes a decline in blood vessel elasticity, leading to unstable blood pressure (Widiyanto, 2020).

Management of hypertension involves both pharmacological and non-pharmacological approaches. Drug therapy such as beta-blockers is effective in reducing blood pressure but can cause side effects like bronchospasm (Afrila & Dewi, 2015). Meanwhile, lifestyle modifications—avoiding smoking, managing stress, and exercising regularly—are considered essential (Dewiyulian, 2024; Pertiwi & Juwita, 2023). According to Russo et al. (2023), stress increases stress hormones, which trigger elevated blood pressure.

One proven effective non-pharmacological therapy is deep breathing relaxation. Hastuti (2005) reported a decrease in systolic pressure from 177.33 mmHg to 173.20 mmHg and diastolic pressure from 95.87 mmHg to 90.57 mmHg after intervention, indicating a significant effect (Hastuti, 2005).

A recent meta-analysis by Garg et al. (2023) found that breathing exercises reduced systolic pressure by an average of 7.06 mmHg and diastolic pressure by 3.43 mmHg, and reduced heart rate by approximately 2.41 bpm. Other analyses also reported similar reductions (approximately 6/3 mmHg) after eight weeks of deep breathing exercises. Additional studies have shown that just two minutes of breathing

exercises can reduce systolic and diastolic pressure by 8.6 and 4.9 mmHg, respectively. The mechanism of deep breathing includes increased baroreflex sensitivity, activation of the parasympathetic nervous system, and increased heart rate variability (HRV), all of which contribute to lowering blood pressure (Frontiers, 2023). This phenomenon encourages further research into the effectiveness of deep breathing relaxation therapy in patients with hypertension.

Methods

Study Design

The strategy used to search for articles using the PICO framework*: Population/*Problem. The population or problem analyzed in this literature review is the population or problem in hypertensive patients. *The intervention* is a management action for individual or community cases. Giving decoction of bay leaves lowers blood pressure. *Compari*son means no other treatments are used as comparisons in this literature review. *Outcome*, the results or outcomes obtained in the research in this literature review were a decrease in blood pressure after being given deep breathing relaxation technique therapy

Samples/Participants

Researchers found journals that matched the 223 keywords. The research journals were then screened a total of 211 journals were excluded because they were published in 2010 and below and used languages other than English and Indonesian. Assessment of the feasibility of 13 journals, published journals, and journals that did not meet the inclusion criteria were excluded, resulting in 5 journals being reviewed.

Data Collection

The data in this research is secondary data taken from the Google Scholar database over the last ten years and uses an experimental design. So, five articles were reviewed.

Data Analysis

Data analysis in this research was carried out using the PICO method *(Population/Problem, Intervention, Comparison, Outcome)*

Results

This literature review was synthesized using a narrative method by grouping similar extracted data according to the results measured to answer the objectives. Research journals that meet the inclusion criteria are then collected and a journal summary is made including the name of the researcher, year of publication, title, research methods, and results as well as the database.
Table 1 List of articles resulting from disbursement

No	Name	Year	Vol	Title	Method	Results	Databases
1.	Wijayanti S, Setiyo WE	2019	Vol 6, no 1	The Effect of Deep Breathing Relaxation Techniques on Reducing Blood Pressure in Hypertensive Patients at Dr. Hospital. Soeratno Gemolong 2018	D: *pra expreriment* dan *one grup pretest posstest* S: 25 pasien V: hipertensi, tekanan darah, teknik relaksasi nafas dalam I: sphygmomanometer digital A: uji *paired t-test*	showed that from 25 hypertensive patients, the average pre-systolic blood pressure was 153.80 mmHg, pre-diastolic blood pressure was 94.40 mmHg, the standard deviation for pre-systole was 9.211, and pre-diastole was 10.206. The pre-systolic blood pressure results in hypertensive patients obtained the lowest value of 142 mmHg and the highest value of 170 mmHg. While the pre-diastolic blood pressure results in hypertensive patients obtained the lowest value of 77 mmHg and the highest value of 121 mmHg. From the interval estimation results, it can be concluded that it is 95% certain that the average pre-systolic blood pressure in hypertensive patients is 150.00 to 157.60, while pre-diastolic is 90.19 to 98.61 .	Google Scholar
2.	Cahyanti L, Febriyanto	2017	Vol 6, no 2	The effect of deep breathing exercises on changes in blood pressure in patients with essential hypertension at the Putri Ayu Community Health Center, Jambi City	D: *pre-expreriment* S: 30 orang V: hipertensi, Teknik relaksasi nafas dalam I: *sphygmomanometer digital* dan stetoskop A: *paired t-test.*	The results of this study showed that the mean value of systolic blood pressure decreased from 158.00 mmHg to 131.00 mmHg. Meanwhile, the mean value of diastolic blood pressure decreased from 117.33 mmHg to 73.00 mmHg. From the table above, the mean and median values of systole in respondents before and after giving the deep breathing exercise intervention showed a significant decrease. The results of research conducted on 30 respondents suffering from essential hypertension at the Putri Ayu Community Health Center, Jambi City Before and after deep breathing exercise intervention for three days showed that the mean in systole was 27.00 mmHg, while the mean in diastole was 40.00 mmHg.	Google Scholar
3.	Rini Tri Hastuti	2019	Vol 6, No 1	Reducing blood pressure using deep breathing techniques in hypertensive patients at the Bendosari Community Health Center, Sukoharjo Regency	D: *Pra Eksperimental* S: 30 orang V: Teknik Nafas Dalam, Penurunan Tekanan Darah, Hipertensi I: *sphygmomanometer* A: uji *paired t-test*	Statistical test results using a paired t-test on systolic blood pressure obtained a value of p= 0.000, and diastolic blood pressure obtained a value of p= 0.000, meaning that at an alpha of 5%, there was a significant difference between the average blood pressure in hypertensive patients before and after the procedure deep breathing technique therapy, namely Ho is rejected and Ha is accepted, which means there is an effect of deep breathing technique on reducing blood pressure in hypertensive patients at the Bendosari Community Health Center, Sukoharjo Regency .	Google Scholar
4.	Lutfi M, Fauziyah J L, Abdillah A	2019	Vol 3, no 1	The effectiveness of deep breathing relaxation techniques in reducing blood pressure	D: *quasy expreriment desaign* S: 34 orang V: Hipertensi, Tekanan Darah, Relaksasi Nafas Dalam	The results showed a decrease in diastolic blood pressure values before and after being given the deep breathing relaxation technique intervention (deep breathing) with a mean before the intervention of 103.82 and after being	Google Scholar

				in hypertensive patients at the Cibatu Community Health Center, Garut Regency	I: *sphygmomanometer* A: *paired T-test*	given the intervention of 89.41. The difference in systolic blood pressure values was 14.412 with a standard deviation of 5,040. The statistical test results obtained a p-value of 0.000 (p<0.05), which means there is a significant difference between the diastolic blood pressure values before and after the deep breathing relaxation technique intervention.	
5.	Hartanti RD	2016	Vol IX, no 1	Deep Breathing Relaxation Therapy Lowers Blood Pressure in Hypertension Patients	D: *quasy expreriment desaign* S: 20 respondents V: relaksasi, nafas dalam, tekanan darah, hipertensi I: *sphygmomanometer* A: *paired sample T-test*	The results of this study showed that the average value of systolic blood pressure after being given deep breathing relaxation therapy decreased by 18.46 mmHg and the average diastolic blood pressure decreased by 6.54 mmHg. In this study, the confidence level taken was 95% with α 5% (0.05). Based on statistical analysis using paired sample T-test, the systolic blood pressure ρvalue was 0.001 and the diastolic blood pressure ρvalue was 0.001. This means that the ρvalue is smaller than the α value of 5% (0.05), so H0 is rejected, which means there is an effect of deep breathing relaxation therapy on reducing blood pressure in hypertensive patients in Kesesi Village, Kesesi District, Pekalongan Regency.	Google Scholar

According to Cahyati and Febriyanto (2017), the study titled *The Effect of Deep Breathing Relaxation Techniques on Reducing Blood Pressure in Hypertensive Patients at Dr. Soeratno Hospital Gemolong* used a pre-experimental one-group pretest-posttest design with accidental sampling. The dependent variables were hypertension, blood pressure, and deep breathing relaxation techniques. Using a digital sphygmomanometer, the study analyzed data with paired t-tests. Among 25 patients, average pre-systolic blood pressure was 153.80 mmHg and pre-diastolic was 94.40 mmHg. The lowest and highest pre-systolic values were 142 mmHg and 170 mmHg; for pre-diastolic, 77 mmHg and 121 mmHg. Confidence interval estimates showed 95% confidence that the average pre-systolic was between 150.00 and 157.60 mmHg, and pre-diastolic between 90.19 and 98.61 mmHg.

Lestari (2014) examined the effect of deep breathing exercises on blood pressure in essential hypertension patients at the Putri Ayu Community Health Center, Jambi City, using a pre-experimental design and purposive sampling. Data analysis with paired t-tests showed systolic blood pressure decreased from 158.00 mmHg to 131.00 mmHg, and diastolic from 117.33 mmHg to 73.00 mmHg.

According to Rini Tri Hastuti and Insiyah (2005), deep breathing techniques significantly reduced blood pressure in hypertensive patients at the Bendosari Community Health Center, Sukoharjo Regency. Paired t-tests showed $p = 0.000$ for both systolic and diastolic, indicating significant differences after intervention.

Lutfi, Fauziyah, and Abdillah (2019) found deep breathing relaxation techniques reduced diastolic blood pressure from 103.82 mmHg to 89.41 mmHg in hypertensive patients at the Cibatu Community Health Center, Garut District, with $p < 0.05$ indicating statistical significance.

Hartanti (2016) showed that deep breathing relaxation therapy reduced average systolic blood pressure by 18.46 mmHg and diastolic by 6.54 mmHg in hypertensive patients in Kesesi Village, with p-values of 0.001, confirming significance.

Discussion

Based on the five journals that have been analyzed, show that there is an effect of deep breathing relaxation on reducing blood pressure in hypertensive patients. This is because deep breathing relaxation therapy can reduce blood pressure, both systolic and diastolic pressure. The work of this therapy can provide cardiopulmonary stretching. Stretching stimulation in the aortic arch and carotid sinus is received and transmitted by the vagus nerve to the medulla oblongata (cardiovascular regulation center), and then the baroreceptor reflex increases. Afferent impulses from baroreceptors reach the heart center which will stimulate the parasympathetic nerves and inhibit the sympathetic center, resulting in systemic vasodilation, decreased heart rate, and contractions (Lutfi, Fauziyah, & Abdillah, 2019).

According to the researchers' assumptions based on the analysis carried out in the five journals, the decrease in blood pressure in hypertension sufferers depends on the age of patients because as age increases, the elasticity of blood vessels decreases. This is supported by research by (Harmono, 2010), which states that blood pressure increases with age. In general, hypertension appears at the age of 30-50 years. The incidence rate increases at the age of 50-60 years. This is caused by physical decline and weakened heart strength. Age also affects baroreceptors in blood pressure measurement. Age also affects the elasticity of the arteries so that the pressure in the blood vessels increases.

From the results of the analysis carried out by researchers from the first and second journals, it was found that in the first journal, relaxation was carried out for 30 days for 7 times per minute, and for 25 hypertensive patients the average systolic blood pressure before the deep breathing relaxation technique was carried out was 153.80 mmHg. and the average diastolic blood pressure before the deep breathing relaxation technique was carried out was 94.40 mmHg. Meanwhile, the average systolic blood pressure after the deep breathing relaxation technique was carried out was 84.80 mmHg. This shows a difference in systolic and diastolic blood pressure in hypertensive patients after and before deep breathing relaxation techniques.

From the results of the analysis carried out by researchers from the first and second journals, it was found that in the first journal, relaxation was carried out for 30 days for 7 times per minute, and for 25 hypertensive patients the average systolic blood pressure before the deep breathing relaxation technique was carried out was 153.80 mmHg. and the average diastolic blood pressure before the deep breathing relaxation technique was carried out was 94.40 mmHg. Meanwhile, the average systolic blood pressure after the deep breathing relaxation technique was carried out was 84.80 mmHg. This shows a difference in systolic and diastolic blood pressure in hypertensive patients after and before deep breathing relaxation techniques.

Then from the results of the analysis of journals three, four, and five, it was found that the third journal only conducted research with the intervention group, in the third journal it was also explained that the reduction in blood pressure for each respondent had different results due to the factors that influenced it.

Meanwhile, in the fourth journal, a statistical analysis intervention was carried out using a paired sample T-test, and the p-value for systolic blood pressure was 0.001 ($p<\alpha=0.05$). This shows that deep breathing relaxation therapy is effective in hypertensive patients. According to the author's assumption, deep breathing relaxation carried out regularly will be able to maintain the level of blood pressure that it should be in patients suffering from hypertension if bad habits such as consuming foods containing high levels of salt and smoking are reduced, then this can be accompanied by carrying out activities. like light exercise.

Conclusion

The application of deep breathing relaxation is effective as a non-pharmacological therapy for lowering blood pressure in hypertensive patients because this therapy is a therapy that works based on the sympathetic and parasympathetic nervous systems, thus producing physiological responses such as relaxing breathing. The results are comparable to the theory that deep breathing relaxation can reduce blood pressure in hypertensive patients.

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