



The Effect of Slow Deep Breathing on Lowering Blood Pressure in Elderly People with Hypertension in Karangdowo Village, Sumberrejo District, Bojonegoro Regency

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Abstract. Hypertension or high blood pressure is a condition in which a person experiences an increase in blood pressure above normal for a long time. The purpose of this study was to determine the effect before and after administration of Slow Deep Breathing on reducing blood pressure in patients with hypertension. This research method used a one group pre-posttest design with a purposive sampling technique of 33 respondents. The research data were taken using a sphygmomanometer blood pressure observation sheet and then analyzed using the Wilcoxon signed rank test. The results showed that the blood pressure of elderly people with hypertension before Slow Deep Breathing therapy obtained an average of 2.33, while after SDB therapy, the average blood pressure decreased to 1.52. The results of the Wilcoxon signed rank test was with a significant value of $p = 0.000$ ($p < 0.05$). In other words, H_1 was accepted and H_0 was rejected, meaning that there was an effect before and after SDB on blood pressure in elderly people with hypertension. In conclusion, Slow Deep Breathing therapy with breathing techniques slowly and deeply uses the diaphragm muscles, which allows the abdomen to be lifted slowly and the chest to expand fully. Thus, there is an effect on lowering blood pressure.

Keywords: Hypertension, Blood Pressure, Slow Deep Breathing

1. INTRODUCTION

High blood pressure or hypertension is a chronic disease caused by an increase in blood pressure in the systemic arteries. It leads to heart disease, kidney failure, and cerebrovascular issues. (Berek, 2018) Hypertension is a form of cerebrovascular system disturbance that decreases the supply of oxygen and nutrients to the brain. Despite being a non-communicable disease, it remains a major global health problem. (Anbari Z, 2019) Hypertension is defined as an increase in blood pressure above normal levels. It is typically identified when systolic pressure exceeds 140 mm Hg and diastolic pressure exceeds 90 mm Hg. (Sumartini NP, 2019) This condition is often called a "silent killer" because it sometimes presents without clear symptoms.

According to the World Health Organization (WHO), the estimated global prevalence of hypertension was 22% in 2021. Africa had the highest prevalence at 27%, while Southeast Asia was third with a 25% prevalence among its population. National health research in 2021 indicated that the prevalence of hypertension in Indonesia rose to 34.11% among those aged over 18, up from 25.8% in 2013. The highest prevalence was found in South Kalimantan (44.13%), followed by West Java (39.6%) and East Kalimantan (39.3%). [6] Additionally, in East Java province, the prevalence among individuals aged 15 and older reached 11,008,334 people, with 48.83% being male and

51.17% female. In Bojonegoro Regency, there were 385,465 individuals with hypertension, comprising 189,200 males and 196,265 females.

An initial survey conducted on October 28, 2022, at an integrated health service (Posyandu) for the elderly in Karangdowo Village, Sumberrejo District, Bojonegoro Regency, revealed that out of 10 elderly people who checked their blood pressure, 7 (70%) had hypertension, while 3 (30%) did not. The respondents were aged between 65 and 70 years and reported symptoms such as headaches and palpitations, indicating a high incidence of hypertension in this group.

Several factors contribute to hypertension, including genetic disorders, lifestyle choices, obesity, lack of exercise, alcohol consumption, and diet. Secondary causes include kidney disorders, endocrine issues, and the use of hormonal contraception. (Apidianti, 2017) Hypertension can also result from cardiac output, total peripheral resistance, arteriosclerosis, and varies with emotional states, activities, and overall health conditions. Baroreceptors regulate blood pressure in the short term, affecting the brain, nervous, and endocrine systems. (Labdullah P, Ricky Z, 2020) The consequences of high blood pressure include serious illnesses and complications like stroke, myocardial infarction, kidney failure, and heart attack. Myocardial infarction in the coronary arteries can lead to changes in electrical conduction time through the ventricles, causing dysrhythmias, cardiac hypoxia, and increasing the risk of clot formation. (Triyanto, 2018)

Reducing the risk of hypertension can be achieved pharmacologically and non-pharmacologically. Pharmacological treatment involves administering antihypertensive drugs such as Captopril and Amlodipine. Non-pharmacological methods include relaxation techniques like the Slow Deep Breathing (SDB) method. (Mayasar, 2010) SDB involves consciously regulating breathing slowly while in a relaxed, upright state (2). According to Berek (1), SDB can be practiced at any time, 16-19 times per minute or less. SDB reduces the frequency of breathing by taking slow, regular breaths, which helps control blood pressure.

Although various studies have shown the effectiveness of pharmacological treatments and some non-pharmacological methods like exercise and diet management in controlling hypertension, there is limited research specifically focusing on the impact of SDB in elderly populations in rural settings such as Karangdowo Village. This study aims to fill this gap by evaluating the specific effects of SDB on blood pressure reduction

among the elderly with hypertension in this locality. This research will provide valuable insights into the potential of SDB as an accessible and effective non-pharmacological intervention for managing hypertension in rural elderly populations.

The purpose of this study aimed was to determine examine the effect of slow deep breathing on reducing blood pressure in elderly people with hypertension.

2. METHODS

This research applied a quasi-experimental design with a non-equivalent control group approach. The population comprised all elderly individuals in Karangdowo Village, Sumberrejo District, Bojonegoro Regency, totaling 53 elderly. The samples were obtained by purposive sampling, resulting in 33 participants. This research was conducted at the Posyandu for the elderly in Karangdowo Village, Sumberrejo District, Bojonegoro Regency.

3. INTERVENTION

Intervention Type: Slow Deep Breathing (SDB) Technique

Objective: To evaluate the effect of the Slow Deep Breathing (SDB) technique on lowering blood pressure in elderly individuals with hypertension.

Duration: 4 weeks

Frequency: Twice daily (morning and evening)

Session Length: Each session lasts for 15 minutes

Preparation:

1. Participant Education:

- Prior to starting the intervention, participants will be educated about the SDB technique. This includes a demonstration of proper breathing techniques, emphasizing slow and deep inhalations and exhalations.
- Participants will be informed about the benefits of SDB in managing hypertension and reducing stress.

2. Baseline Measurements:

- Participants' blood pressure will be measured using a calibrated sphygmomanometer to establish baseline readings. Measurements will be taken three times to ensure accuracy, and the average reading will be recorded.

3. Environment Setup:

- A quiet, comfortable environment will be provided for participants to practice SDB. Chairs with back support will be arranged to ensure participants can sit comfortably in an upright position.
- Ambient noise will be minimized to create a conducive atmosphere for relaxation and deep breathing.

4. Instruction Materials:

- Participants will receive written instructions and visual aids to guide them through the SDB process. This will include steps on how to breathe deeply, maintain a consistent rhythm, and focus on relaxation.

Intervention Process:

1. Starting the Session:

- Participants will sit comfortably with their back straight, hands resting on their laps, and feet flat on the floor.
- They will be instructed to close their eyes to enhance concentration and reduce distractions.

2. Breathing Technique:

- Participants will inhale slowly and deeply through their nose for a count of 4, allowing their abdomen to expand.
- They will hold their breath for a count of 4.
- Participants will then exhale slowly and completely through their mouth for a count of 6, ensuring all the air is expelled from their lungs.
- This cycle of inhalation, holding, and exhalation will be repeated continuously for 15 minutes.

3. Monitoring and Feedback:

- Throughout the intervention period, participants will be monitored to ensure they are practicing the technique correctly.
- Weekly feedback sessions will be held to address any difficulties, reinforce proper technique, and provide encouragement.

Post-Intervention:

1. Follow-Up Measurements:

- At the end of the 4-week period, participants' blood pressure will be measured again using the same procedure as the baseline measurement.

- The data will be compared to the baseline readings to assess the effectiveness of the SDB intervention.

2. Data Analysis:

- The changes in blood pressure will be analyzed statistically to determine the significance of the intervention's impact.

Novelty of the Intervention:

- **Target Population:** This intervention specifically focuses on elderly individuals in a rural setting, addressing a gap in the existing literature where the impact of SDB on rural elderly populations is under-researched.
- **Structured Approach:** Unlike previous studies, this intervention employs a structured and systematic approach to SDB, with detailed guidelines, consistent session lengths, and bi-weekly monitoring to ensure adherence and correct practice.
- **Comprehensive Education:** The inclusion of thorough participant education and the use of visual aids enhance understanding and adherence, which may lead to more effective outcomes.
- **Accessibility:** By conducting the intervention in a familiar, community-based setting (Posyandu), the study aims to improve accessibility and convenience for participants, potentially leading to better engagement and sustainability of the practice.

Data Collection Process

The researcher collected data by visiting Karangdowo Village to obtain information on hypertension sufferers. The research was explained to the participants, including that it would be conducted over a period of one week. Blood pressure measurements were taken both before and after the implementation of the Slow Deep Breathing (SDB) therapy. Participants were asked to sign a consent form prior to the commencement of the research.

Initially, pre-test observation sheets were provided to the participants to record their baseline blood pressure. Following this, the participants underwent a 15-minute session of SDB therapy. After the therapy, their blood pressure was measured again, and post-test observation sheets were filled out.

The collected data from the pre- and post-test blood pressure measurements were then tabulated and analyzed. Blood pressure observation sheets were used for data collection. This study was conducted from March to April 2023. The SDB intervention

was administered over one week, with each session lasting 10-15 minutes, conducted three times during the week.

Data Analysis

Data analysis is an important part of achieving research objectives, which is to answer questions that include events. The results of the normality test between pre- and post-test on SDB therapy had a significant value of 0.000 ($P < 0.05$), indicating that the data was not normally distributed. Consequently, the researchers used the Wilcoxon signed-rank test to calculate the effect of SDB therapy. The results showed that the calculated Z value was -4.669 ($Z > -1.645$) and the Asymp. Sig (2-tailed) was 0.000 ($P < 0.05$). Therefore, H1 was accepted and H0 was rejected, indicating a significant effect of SDB therapy on reducing blood pressure in elderly people.

Ethical Consideration

This research has been reviewed and approved by the Research Ethics Commission at the University of Muhammadiyah Lamongan and declared to have passed an ethical review or "Ethical Clearance" with certificate number 297 /EC /KEPK - S1/06/2023.

4. RESULT AND DISCUSSION

Data on Table 1 show the characteristics of the respondents including age, gender, occupation, and illness duration.

Table 1. Characteristics of the Respondents

No.	Characteristics of Respondents	Frequency	Percentage (%)
Age			
1	60-65 Years	20	60.6%
2	66-70 Years	5	15.2%
3	71-75 Years	8	24.2%
Total		33	100%
Gender			
1	Woman	27	81.8%
2	Man	6	18.2%
Total		33	100%
Occupation			
1	Housewife	8	24.2%
2	Self-employed	7	21.2%

3	Civil servant	3	9.1%
4	Farmer	10	30.3%
5		5	15.2%
Total		33	100%
Illness duration			
1	< 1 year	25	75.8%
2	1-3 Years	8	
Total		33	100%

Data on Table 2 show the respondents' blood pressure levels before the SBD therapy is given.

Table 2. Respondents' Blood Pressure Levels before SBD Therapy

No	Blood pressure	Pre-test	
		Total	Percentage (%)
1	Mild	0	0.0%
2	Moderate	22	66.7%
3	Severe	11	33.3%
Total		33	100%

Before SDB therapy was given, the majority of respondents experienced moderate hypertension (66.7%), while 33.3% of the respondents experienced severe hypertension.

Data on Table 3 indicate the respondents' blood pressure levels after SDB therapy was given.

Table 3. Respondents' Blood Pressure Levels after SBD Therapy

No	Blood pressure	Post-test	
		Total	Percentage (%)
1	Mild	21	63.6%
2	Moderate	7	21.2%
3	Severe Hypertension	5	15.2%
Amount		33	100%

After being given slow deep breathing therapy, the majority of the respondents (63.6%) experienced mild hypertension, 21.2% of the respondents experienced moderate hypertension, and only 15.2% of respondents experienced severe hypertension.

Data on Table 4 indicate the effect of SDB on reducing respondents' blood pressure.

Table 4: Effect of SDB Therapy on Blood Pressure Reduction

Metric	Pre-therapy	Post-therapy
Mean	2.33	1.52
Standard Deviation	0.479	0.755
P-value	-	<0.001
Wilcoxon Z	-	-4.669

Before being given SDB therapy, respondents' blood pressure had an average of 2.33 with the lowest of 2 and the highest of 3. However, after being given SDB therapy is, the average was 1.52 with the lowest hypertension score of 1 and the highest of 3. Thus, the difference before and after being given SDB therapy was 0.81.

The Wilcoxon signed-rank test obtained Z value of 4.669b, while the Z - table value was obtained through Z- table with $\alpha = 5\%$ or 0.05, so the value was around -1.645 (Zcount > Ztable), or in the area of H_1 . Thereby, with the significance *p-values* of 0.000 ($p < 0.05$), H_0 was rejected. The results indicated that there was an effect of SDB therapy on reducing blood pressure in elderly people with hypertension.

Discussion

The implementation of Slow Deep Breathing (SDB) therapy among elderly individuals with hypertension yielded significant reductions in blood pressure levels. Prior to the intervention, a majority of respondents exhibited moderate hypertension (66.7%), with the remaining 33.3% experiencing severe hypertension. None presented with mild hypertension. This observation aligns with findings from prior studies which underscore the prevalence of hypertension among aging populations. (Dusk Amalia,2019)

Following SDB therapy, a notable shift occurred in respondents' blood pressure profiles. The majority transitioned to mild hypertension (63.6%), indicative of a favorable response to the intervention. These results echo the findings of Rio and Sunarno, emphasizing the effectiveness of SDB in reducing blood pressure levels among hypertensive individuals. SDB's mechanisms include enhancing oxygen supply, reducing oxygen demand, and modulating the autonomic nervous system, ultimately leading to blood pressure reduction.(Dusk Amalia,2019)

The statistical analysis, employing the Wilcoxon signed-rank test due to non-normally distributed data, corroborated the significant impact of SDB therapy. The mean blood pressure decreased substantially from 2.33 to 1.52 post-therapy, with a p-value

<0.001 , supporting the efficacy of the intervention. These findings resonate with Muchtar et al. (2022), further validating the utility of SDB in hypertension management. (Triyanto, 2018)

Risk factors contributing to hypertension in the elderly encompass age, gender, lifestyle habits, and environmental factors. (Nursalam, 2014) Non-pharmacological interventions, such as SDB therapy, offer viable alternatives in hypertension management (Potter & Perry, 2010). By promoting relaxation and optimizing autonomic nervous system function, SDB therapy demonstrates promise in reducing blood pressure levels and improving overall well-being. (Sumartini NP, 2019)

In conclusion, SDB therapy emerges as a potent intervention for lowering blood pressure levels in elderly individuals with hypertension. Its efficacy, supported by empirical evidence and physiological mechanisms, positions it as a valuable adjunct to conventional treatments. Further research and widespread implementation of SDB therapy hold promise for enhancing hypertension management and promoting cardiovascular health in aging populations.

5. CONCLUSION AND RECOMMENDATION

Conclusion

The findings of this study demonstrate the effectiveness of Slow Deep Breathing (SDB) therapy in reducing blood pressure levels among elderly individuals with hypertension in rural settings. Prior to the intervention, a significant proportion of the participants exhibited moderate to severe hypertension. However, following the implementation of SDB therapy, a substantial reduction in blood pressure levels was observed, with the majority transitioning to mild hypertension. This highlights the potential of SDB as a non-pharmacological intervention for managing hypertension and improving cardiovascular health in elderly populations.

The statistical analysis, using the Wilcoxon signed-rank test, revealed a significant decrease in mean blood pressure post-therapy, further validating the efficacy of SDB in hypertension management. These findings are consistent with prior research, indicating the robustness of SDB as a therapeutic intervention for blood pressure reduction.

Moreover, the structured approach employed in this study, coupled with comprehensive participant education and community-based intervention delivery, enhances the accessibility and feasibility of SDB therapy in rural settings. By addressing

the unique needs of elderly individuals in such contexts, this study contributes valuable insights into the potential of SDB as a sustainable and cost-effective strategy for hypertension management.

Recommendation

Moving forward, it is recommended to further investigate the long-term efficacy and comparative effectiveness of Slow Deep Breathing (SDB) therapy in managing hypertension among elderly populations. Additionally, efforts should be made to integrate SDB therapy into community-based health programs, ensuring widespread access and implementation. Patient education initiatives focusing on SDB techniques and benefits should be prioritized, supported by policy measures that endorse holistic approaches to hypertension management. By addressing these recommendations, stakeholders can enhance the accessibility, affordability, and effectiveness of SDB therapy as a non-pharmacological intervention for hypertension control among elderly individuals.

6. REFERENCES

- Anbari, Z., et al. (2019). Hypertension: A major health problem.
- Apidianti. (2017). Correlation between the use of hormonal birth control and the incidence of hypertension at the Gugul Poskesdes in the working area of the Tlanakan Health Center.
- Asikin, M., Nuralamsyah, M., & Susaldi. (2016). *Medical surgical nursing: Cardiovascular system*. Erlangga.
- Berek. (2018). Effect of slow deep breathing and sodium regulation on reducing blood pressure in primary hypertension patients. *Journal*, 499-508.
- Bojonegoro District Health Office. (2021). *Health profile of Bojonegoro Regency 2021*. Bojonegoro: Bojonegoro District Health Office.
- Dusk Amalia, T. P. (2019). Elderly care. *Medic Earth*.
- Dwi Sulastri. (2017). Caring for elderly humans. *Seniors*, 67(6), 14-21.
- East Java Provincial Health Office. (2021). *Health profile 2021*.
- Indonesian Ministry of Health. (2021). *Riskesdas 2021 report*.
- Labdullah, P., & Ricky, Z. (2020). Application of isometric handgrip exercise in lowering blood pressure in patients with hypertension: Literature review.
- Lie, A. (2007). *Cooperative learning: Mempraktikkan cooperative learning di ruang-ruang kelas*. Gramedia Widiasarana.

- Mayasari. (2019). The effect of slow deep breathing on reducing blood pressure in hypertensive patients.
- Ministry of Health. (2021). Hypertension is the main cause of heart disease, kidney failure, and stroke.
- Muchtar, R. S. U., Natalia, S., & Patty, L. (2022). The effect of slow deep breathing on lowering blood pressure in hypertension patients. *Abdurrah Nurs J*, 6(1), 85-93.
- Nursalam. (2014). *Nursing science research methodology: A practical approach*. Salemba Medika.
- Nursalam. (2016). *Nursing science research methodology: Practical approach* (4th ed.). Salemba Medika.
- Novantica. (2015). The effectiveness of guided imagery and deep breathing relaxation on reducing hypertensive adolescent blood pressure at the Kedungmundu Health Center Semarang. *Semarang Muhammadiyah University*.
- Potter, P., & Perry, A. G. (2010). *Fundamentals of nursing*. Salemba Medika.
- Priyatni, E. T. (2014). *Desain pembelajaran bahasa Indonesia dalam kurikulum 2013*. Bumi Aksara.
- Rio, M. K., & Sunarno, R. D. (2022). The effect of slow deep breathing in lowering blood pressure in hypertension sufferers in Prambanan Lor Village. *J Nurs Midwifery*, 13(1), 264-269.
- Rusyana, Y. (1984). Penggunaan bahasa Indonesia oleh guru. Dalam *Bahasa dan sastra dalam gamitan*. CV Diponegoro.
- Smeltzer, S. C., & Bare, B. G. (2015). *Textbook of medical-surgical nursing* (Brunner & Suddart).
- Suryabrata, S. (2009). *Metodologi penelitian*. PT Raja Grafindo Persada.
- Supriyono. (2019). Analysis of factors related to systolic blood pressure in community health center management training participants. *J Inspiration*, 10(1), 32-48. <https://doi.org/10.35880/inspiration.v10i1.62>
- Sumartini, N. P., & Miranti, I. (2019). The effect of slow deep breathing on blood pressure in elderly hypertension at the Ubung Health Center in Central Lombok. *Integrated Nursing Journal*.
- Triyanto. (2018). *Integrated nursing services for hypertension sufferers*. Science Graha.
- Wicaksono, B., Sagita, L., & Nugroho, W. (2017). Model pembelajaran group investigation (GI) dan think pair share (TPS) terhadap kemampuan berpikir kritis. *AKSIOMA: Jurnal Matematika Dan Pendidikan Matematika*, 8(2), 1-8.
- World Health Organization (WHO). (2021). Hypertension. WHO.

Yusuf, A. The effect of slow deep breathing technique on blood pressure in elderly with hypertension in the work area of the Cileunyi Health Center, Bandung Regency.