Open Access Health Scientific Journal
https://oahsj.org/index.php/oahsj Vol. 6 No. 1 February 2025, pp. 1-5
Research article

Can Slow Breathing Exercise Reduce Blood Pressure In Elderly People With Hypertension in UPT PSTW Banyuwangi?

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ARTICLE INFO

Keywords:
Blood Pressure,
Elderly,
Hypertension,
Slow Breathing Exercise.

ABSTRACT

Background: Hypertension is one of the leading causes of morbidity and mortality worldwide. High blood pressure (BP) is a non-communicable disease that is a risk factor for cardiovascular disease. Non-pharmacological treatments, such as slow breathing exercise (SBT), have been shown to lower blood pressure. This study aimed to analyze the effect of slow breathing exercise on lowering blood pressure in elderly hypertension**.**

Methods: This research is an experimental study with the research design used is one group pre-test and post-test with control group. The population in this study were all elderly people who lived in UPT PSTW Banyuwangi with a research sample of elderly people suffering from hypertension. Sampling using purposive sampling method and obtained 36 respondents. Respondents were divided into 2 groups, which were the treatment group with slow breathing exercise intervention and the control group without any intervention. blood pressure was measured before and after treatment using an aneroid tensimeter. the data was collected then processed and analyzed using SPSS with the test used, namely the Wilcoxon test.

Results: Based on the results of statistical tests using the Wilcoxon test, a significance value of p <0.05 was obtained, which means that slow breathing exercise has an effect on lowering blood pressure in hypertensive elderly people. the application of slow breathing exercise is also more effective than in the control group, characterized by a difference in the mean pre-test and post-test values of 8.88 mmHg.

Conclusion: slow breathing exercise has an effect on lowering blood pressure in hypertensive elderly people so that this can be used as a non-pharmacological therapy as an effort to control or lower blood pressure in hypertensive elderly people and its application is very easy to do.

I. Introduction

Hypertension is one of the leading causes of morbidity and mortality worldwide. High blood pressure (BP) is a non-communicable disease that is a risk factor for cardiovascular disease (Yuenyongchaiwat et al., 2024). Several large-scale meta-analyses have shown that lowering systolic blood pressure and diastolic blood pressure can reduce the incidence of stroke, coronary heart disease, and mortality (Chang et al., 2015). According to the American Heart Association (2024) hypertension or high blood pressure occurs when the force of blood flowing through blood vessels becomes too high over time. As age grows, a person's risk of developing hypertension increases because in the elderly the condition of the vascular system has decreased elasticity so that the arteries become stiff.

Received 12 October 2024; Accepted 3 December 2024; Published 1 February 2025
 DOI: https://doi.org/10.55700/oahsj.v6i1.53

The prevalence of hypertension has increased, especially in low- and middle-income countries, including Indonesia (Mills et al., 2020). An estimated 46% of adults with hypertension are unaware of their condition (WHO, 2023). The incidence of hypertension in Indonesia in 2018 was 36.3% (Ministry of Health, 2018). Meanwhile, in Banyuwangi Regency in 2019 the estimated number of people with hypertension aged ≥ 15 years was 457,059 and in 2020 it increased to 477,570 with 228,495 males and 249,075 females (Dinkes Banyuwangi, 2020).
High blood pressure can be treated with pharmacological and non-pharmacological interventions. Non-pharmacological treatments, such as slow breathing exercise (SBT), have been shown to lower blood pressure (Yuenyongchaiwat et al., 2024). Slow breathing exercise has an effect on increasing tidal volume so as to activate the Hering-Breuer reflex which has an effect on reducing chemoreflex activity and increasing baroreflex sensitivity which results in decreased sympathetic activity and blood pressure (Joseph et al., 2005).
Some research results show that slow breathing exercise can reduce blood pressure in people who experience hypertension. research conducted by Yuenyongchaiwat et al., (2024) in Thailand on 41 respondents showed that before being given breathing exercise the average blood pressure was 139 mmHg and after the intervention there was a change in the average blood pressure to 132 mmHg, while in the control group there was no change in blood pressure in 30 respondents.
Research conducted by Ublosakka-Jones et al., (2018) on elderly patients with controlled systolic hypertension from recruited from primary care units in the local community and the hypertension clinic, had a decrease in systolic blood pressure by 20 mmHg in the SLB group and 5 mmHg in the control group. Heart rate and diastolic blood pressure also decreased significantly in the SLB group but there was no change in the control group who were given deep breathing control. Slow inspiratory muscle training is effective in reducing resting blood pressure in older people with controlled isolated systolic hypertension. Li et al., (2018) in their research on essential hypertension patients, showed that slow breathing compared to rapid breathing (16 breaths / minute) was able to reduce heart rate and blood pressure and there was a decrease in baroreflex sensitivity while at rest.
However, there is little evidence on the effect of slow breathing on blood pressure in hypertensive patients especially in the elderly in Banyuwangi. Breathing exercises performed six times per minute for 15 minutes have an effect on blood pressure through increased baroreceptor sensitivity and decreased sympathetic nervous system activity and increased parasympathetic nervous system activity in patients with primary hypertension (Witriyani, 2023). The purpose of this study was to analyze the effect of applying slow breathing exercise on lowering blood pressure in elderly hypertension.

METHODS

This research is an experimental research with the research design used is one group pre-test and post-test with control group. The research was conducted at UPT PSTW Banyuwangi in June-July 2024. The population in this study were all elderly people who lived at UPT PSTW Banyuwangi, the research sample was elderly people who had hypertension. Sampling using purposive sampling method where sampling is based on inclusion and exclusion criteria so that 36 respondents are obtained. Respondents were divided into 2 groups, namely the treatment group with slow breathing exercise intervention and the control group without any intervention. blood pressure was measured before and after treatment using an aneroid tensimeter. slow breathing exercise was given for 10 minutes with a breathing rate of 6-10 times per minute for 4 weeks. the data obtained were then collected, processed and analyzed using SPSS using the Wilcoxon test, with a significance value of $p < 0.05$ then H0 was rejected and meant that there was an influence before and after the intervention. As ethical considerations, researchers used informed consent, the principle of anonymity and the principle of confidentiality.

RESULTS

Characteristics of respondents

Table 1 Characteristics of respondents

Group	Gender (%)		Age	BMI
	Male	Female	Mean ± SD	
Treatment	39%	61%	79,31 ± 9,131	26,259 ± 4,6158
Control	44.5%	55.5%	73,84 ± 7,256	25,677 ± 4,1231

BMI : body mass index; SD : standar deviation

Based on table 1 above, the characteristics of respondents based on gender in both the treatment and control groups are almost balanced. There were 7 people (39%) male and 11 people (61%) female in the treatment group, while in the control group there were 8 people (44.5%) male and 10 people (55.5%) female. The mean age in the treatment group was about 79 years and in the control group had a mean of about 73 years. Body mass index in both groups had almost the same mean value, namely the mean in the treatment group of 26kg/m2 and in the control group of 25kg/m2, where both groups were categorized as obese or obese I.

Condition of blood pressure

Table 2. the condition of blood pressure before and after intervention

Group	Blood preasure (sistolic)			
	Mean pre-test	Mean post-test	Mean difference	Sig. (2-tailed)
Treatment	155,07 mmHg	146,19 mmHg	8,88 mmHg	0,000*
Control	142,91 mmHg	140,48 mmHg	2,43 mmHg	0,000*

*Wilcoxon test

Based on table 2 above, it is known that the average blood pressure before intervention in the treatment group was 155.07 mmHg and in the control group was 142.91 mmHg. after being given the intervention, the average blood pressure decreased both in the treatment group (146.19 mmHg) and in the control group (140.48 mmHg). it can also be seen in table 2 that the difference in mean values before and after intervention in the treatment group was 8.88 mmHg with a sig value. (2-tailed) of 0.000 p <0.05, it can be concluded that there is a significant difference between the blood pressure of hypertensive elderly before and after being given slow breathing exercise. in the control group, a decrease was also found with a small mean difference of 2.43 mmHg with a value of p <0.05 which means there is a difference. the results of the difference in the mean value of the treatment group are larger than the control group, so it can be concluded that the application of slow breathing exercise is effective as an effort to maintain blood pressure conditions in hypertensive elderly at UPT PSTW Banyuwangi.

DISCUSSION

Based on the results of the study, slow breathing exercise can reduce blood pressure in elderly hypertension. The results of the analysis obtained a significance value (p) = 0.000 <0.05, then H0 is rejected and H1 is accepted, so it can be concluded that after being given slow breathing exercise for 4 weeks, systolic blood pressure in the elderly suffering from hypertension has decreased by 8.88 mmHg, which means there is an effect of slow breathing exercise on lowering blood pressure in hypertensive elderly. Breathing exercise is a respiratory system method to improve the performance of the lung organs. A good and regular breathing can stabilize blood pressure and improve respiration (Hermansyah et al., 2015). Slow breathing exercise is breathing consciously, to regulate breathing slowly and deeply so that this can make the mind

calm, emotions become better, and the body becomes more relaxed (Tilong, 2017; Witriyani, 2023). Slow breathing has several physiological benefits such as increasing lung stretch receptors, reducing sympathetic nervous system activity and chemoreceptor activators, lowering arterial partial pressure CO2 (PaCO2), preventing renal sodium retention (Srinivasan & Rajkumar, 2019).

The results showed that there was a significant decrease in the treatment group who were given slow breathing exercise and in the control group who were not given any breathing exercises in elderly hypertension at UPT PSTW Banyuwangi. This is in line with research conducted by Srinivasan & Rajkumar, (2019) which showed a significant decrease in systolic blood pressure after being given slow breathing exercises for 30 minutes with a decrease of 12.3 mmHg, while the control group had different results, which was not found differences before and after. Apryanto (2016) in his research conducted on essential hypertension patients for 15 minutes twice a day, showed a significant decrease in systolic blood pressure by 8.47 mmHg. The decrease in systolic blood pressure which is higher in the treatment group than the control group shows that the intervention of slow breathing exercise is more influential than not giving any intervention on lowering blood pressure in elderly hypertension. Apart from the influence of pharmacological therapy, slow breathing exercise also has a relaxing effect on the respondent's body. This relaxed condition affects the relaxation of vascular smooth muscle so that the arteries are able to vasodilate optimally (Apryanto, 2016).

Slow breathing causes parasympathetic dominance by increasing the central inhibitory rhythm, consequently it can also lower blood pressure while increasing baroreflexes. In addition, it can trigger the Heering-Breuer reflex, which in turn reduces the sensitivity of the chemotherapy reflex and thus can increase the baroreflex, with additional effects on lowering blood pressure and sympathetic activity (Sriloy et al., 2015). The mechanism of the baroreceptor reflex begins with the stretching of receptors, namely baroreceptors or presoreceptors located in the walls of several large systemic arteries. Increased pressure will stretch the baroreceptors and cause the signal to travel to the central nervous system, and the feedback signal is then sent back through the autonomic nervous system to the circulation to reduce arterial pressure back to normal levels (Suarez-Roca, 2021). In addition, slow breathing exercise can also reduce sympathetic nerve activity through increased central inhibitory rhythms which will have an impact on reducing sympathetic output. A decrease in sympathetic output will cause a decrease in the release of epinephrine captured by alpha receptors, thus affects vascular smooth muscle. Vascular smooth muscle experiences vasodilation which will reduce peripheral resistance and cause a decrease in blood pressure (Witriyani, 2023).

Based on the analysis, slow breathing exercise which is practiced routinely can control blood circulation and help reduce blood pressure. The application of slow breathing exercise shows that it has provided non-pharmacological alternative treatments to patients, in addition to exercise or gymnastics and taking drugs can increase the knowledge of patients in managing blood pressure in hypertensive patients.

CONCLUSION

Based on the results of the statistical test using the Wilcoxon test, a significance value of $p < 0.05$ was obtained, which means that slow bretahing exercise has an effect on lowering blood pressure in hypertensive elderly people. the application of slow breathing exercise is also more effective than the control group indicated by the difference in the mean pre-test and post-test values of 8.88 mmHg so that this can be used as a non-pharmacological therapy as an effort to control or lower blood pressure in hypertensive elderly people and its application is very easy to do anywhere and anytime.

ACKNOWLEDGMENTS:

Thank you to all respondents and all those who have contributed to this research

CONFLICTS OF INTEREST

No conflict of interest was found during the research

REFERENCES

AHA. 2024. *Facts About High Blood Pressure*. Internet

AHA. 2024. *Understanding Blood Pressure Readings*. Internet

Apryanto, F. (2016). Pengaruh Latihan Tekhnik Slow Breathing Exercise Terhadap Penurunan Tekanan Darah Pada Pasien Hipertensi Esensial. *Jurnal Ilmiah Kesehatan Media Husada*, 5(1), 19–26.

Chang, Q., Liu, R., Li, C., & Shen, Z. (2015). Effects of slow breathing rate on blood pressure and heart rate variabilities in essential hypertension. *International Journal of Cardiology*, 185, 52–54.

Dinkes Banyuwangi. 2021. *Profil Kesehatan Kabupaten Banyuwangi Tahun 2020*. Pemerintah Kabupaten Banyuwangi Dinas Kesehatan

Hermansyah, Lina, R. K., & Aminoto, T. (2015). Pengaruh Breathing Exercise Terhadap Kualitas Hidup Lanjut Usia Di Panti Werdha Ria Pembangunan. *Jurnal Ilmu Dan Teknologi Kesehatan*, 2(2), 57–64.

Joseph, C. N., Porta, C., Casucci, G., Casiraghi, N., Maffeis, M., Rossi, M., & Bernardi, L. (2005). Slow breathing improves arterial baroreflex sensitivity and decreases blood pressure in essential hypertension. *Hypertension*, 46(4), 714–718.

Ministry of Health. 2018. *Laporan Nasional Riskesdas 2018*. Badan Penelitan dan Pengembangan Kesehatan

Li, C., Chang, Q., Zhang, J., & Chai, W. (2018). Effects of slow breathing rate on heart rate variability and arterial baroreflex sensitivity in essential hypertension. *Medicine (United States)*, 97(18), 1–5.

Mills, K. T., Stefanescu, A., & He, J. (2020). The global epidemiology of hypertension. In Nature Reviews Nephrology. *Nature Research*. 16, 223-237

Sriloy, M., Nair, P. M. K., Pranav, K., & Sathyanath, D. (2015). Immediate effect of manual acupuncture stimulation of four points versus slow breathing in declination of blood pressure in primary hypertension—A parallel randomized control trial. *Acupuncture and Related Therapies*, 3(2–3), 15–18.

Srinivasan, B., & Rajkumar, D. (2019). Effects of Slow Breathing on Blood Pressure and End Tidal Carbon Dioxide in Hypertension: Randomised Controlled Trial. Journal Of Clinical And Diagnostic Research.

Suarez-Roca, H., Mamoun, N., Sigurdson, M. I., & Maixner, W. (2021). Baroreceptor modulation of the cardiovascular system, pain, consciousness, and cognition. *Comprehensive Physiology*, 11(2), 1373.

Tilong. 2017. *Yoga dan Meditasi Untuk Mempercepat Kehamilan*. Yogyakarta: Laksana.

Ublosakka-Jones, C., Tongdee, P., Pachirat, O., & Jones, D. A. (2018). Slow loaded breathing training improves blood pressure, lung capacity and arm exercise endurance for older people with treated and stable isolated systolic hypertension. *Experimental Gerontology*, 108, 48–53.

WHO. 2023. *Hypertension*.

Witriyani. (2023). Efektivitas Slow Deep Breathing Exercise (Sdbe) Terhadap Penurunan Tekanan Darah Pada Penderita Hipertensi. *Prosiding Seminar Informasi Kesehatan Nasional (SIKesNas)* 2023, 245–249.

Yuenyongchaiwat, K., Changsri, K., Harnmanop, S., Namdaeng, P., Aiemthaisong, M., Pongpanit, K., & Pariyatkaraphan, T. (2024). Effects of slow breathing training on hemodynamic changes, cardiac autonomic function and neuroendocrine response in people with high blood pressure: A randomized control trial. *Journal of Bodywork and Movement Therapies*, 37, 136–141.