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THE EFFECT OF ERGONOMIC EXERCISE AND ALTERNATE NOSTRIL BREATHING EXERCISE ON REDUCTION BLOOD IN ELDERLY WITH HYPERTENSION

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ABSTRACT

Background: Hypertension is one of the most common *non-communicable diseases (NCDs)* and is known as a *silent killer*. It is a major health problem due to its role as a risk factor for stroke and heart disease in the elderly. In Bengkulu City, the prevalence of hypertension is considered high, with 261,621 individuals diagnosed according to the 2022 Health Office data.
Objective: This study aims to determine the effect of *ergonomic exercise* and *alternate nostril breathing exercise* on reducing blood pressure in elderly people with hypertension at the Lingkar Timur Public Health Center, Bengkulu City.
Method: This research employed a quantitative approach with a *pre-experimental* design, using a *pre-post test design with intervention group*. A total of 43 participants were selected using *random sampling* based on inclusion criteria: aged 55–65 years with blood pressure ≥140/90 mmHg. Instrument reliability was tested by conducting two blood pressure measurements.
Results: The results showed a significant difference in the average systolic and diastolic blood pressure before and after the intervention. Statistical analysis using the *Wilcoxon Signed Rank Test* yielded a *p-value* of 0.000 ($p \leq 0.05$), indicating a significant effect of the intervention on blood pressure reduction.
Conclusion: *Ergonomic exercise* and *alternate nostril breathing exercise* are effective in lowering blood pressure in elderly individuals with hypertension. These interventions can be applied independently by the elderly as a non-pharmacological effort to control blood pressure.

Keywords: Ergonomic Exercise; ANBE; Hypertension; Elderly.

INTRODUCTION

Older adults are individuals who have reached the age of 60 years and above. Aging is an inevitable part of the life cycle that will be experienced by everyone. Older adults undergo a decline in physical condition, psychological changes, and social adjustments.[1]

According to the World Health Organization (WHO), globally there are 1.13 billion people suffering from hypertension, the majority of whom live in developing countries, including Indonesia. Globally, the highest prevalence of hypertension is found in Africa at 27%, while the lowest prevalence occurs in the Americas at 18%.

Based on the Indonesia Health Profile data in 2023, hypertension occurs in the age group 31–44 years (31.6%), 45–54 years (45.3%), and 55–64 years (55.2%). These data indicate that the highest prevalence of hypertension is found in the 55–64 years age group and the lowest in the 31–34 years age group.

According to data from the Bengkulu Provincial Health Office (2023), it is estimated that there are 899,010 people with hypertension in Bengkulu Province. Of this number, only 83,193 people (around 9%) received services according to established standards. Data from the Bengkulu City Health Office in 2023 shows that the prevalence of hypertension in Bengkulu City reached 50,898 people. The highest number of hypertension cases was found at Jembatan Kecil Public Health Center with 4,120 cases, while the lowest was at Sidomulyo Public Health Center with 1,688 cases. Lingkar Timur Public Health Center is also one of the areas with the highest number of hypertension sufferers in Bengkulu City, with 2,906 cases.

Hypertension is often unnoticed by sufferers, causing many individuals to feel physically healthy. The common symptoms include irregular heartbeat, tinnitus, headaches, fatigue, neck pain, and blurred vision. Uncontrolled hypertension can lead to complications such as stroke, heart disease, myocardial infarction, and kidney failure. Management of hypertension can be carried out through pharmacological and non-pharmacological approaches.[2]

Pharmacological treatment involves nurses collaborating with the medical team in administering antihypertensive drugs such as diuretics, angiotensin-converting enzyme inhibitors (ACEIs), calcium antagonists, angiotensin receptor blockers (ARBs), and beta blockers (BBs). Non-pharmacological or complementary therapies include exercise, music therapy, cupping therapy, Alternate Nostril Breathing Exercise, ergonomic gymnastics, and others.[3]

Ergonomic gymnastics is a type of exercise designed to improve posture, flexibility, and balance, as well as reduce muscle tension and stress. Several studies have shown that ergonomic gymnastics can help lower blood pressure by improving blood circulation and overall body relaxation.[4]

Based on the study by Jumari (2021) at Citapen Public Health Center, Ciawi, Bogor City, involving 30 respondents with a frequency of twice a week for two weeks, the average systolic blood pressure before the intervention was 155 mmHg, and after the intervention it decreased to an average of 140 mmHg. This indicates that ergonomic gymnastics has an effect on systolic blood pressure in older adults with hypertension.[5]

Alternate Nostril Breathing Exercise is also known to reduce blood pressure. This technique is significantly associated with nasal cycles, cerebral dominance, and autonomic function. Breathing through the left nostril stimulates the parasympathetic nervous system via the spinal pathway connected to the right cerebral hemisphere, resulting in body relaxation and decreased blood pressure.[6]

Based on Ramadhan's study (2023) conducted in Kedungwaduk Village, Sragen Regency, Central Java, involving 50 respondents with a frequency of four times a week, twice a day (morning and evening) for 10–15 minutes, the average systolic blood pressure before the intervention was 159 mmHg and decreased to 151 mmHg after the intervention. This shows that Alternate Nostril Breathing Exercise has an effect on lowering blood pressure in older adults with hypertension.[7]

RESEARCH METHODS

This study employed a quantitative research method with a pre-experimental design using a one-group pretest–posttest approach without a control group. The research was conducted from August 2024 to June 2025. Data collection was carried out over a two-week period from May 12 to May 30, 2025. The study took place in the working area of Sukamerindu Community Health Center (Puskesmas Sukamerindu), Bengkulu City. The population consisted of all elderly patients diagnosed with hypertension who had a history of outpatient treatment and resided within the working area of Sukamerindu Community Health Center, Bengkulu City.

This study involved 43 respondents. The inclusion criteria were: willingness to participate as indicated by signing informed consent; elderly patients with hypertension with systolic blood pressure ≥140 mmHg and diastolic blood pressure ≥90 mmHg; male and female elderly aged above 55–65 years; no weakness in the upper or lower extremities; physically able to move and suitable for the Ergonomic Exercise and Alternate Nostril Breathing Exercise interventions. The exclusion criteria included respondents who withdrew from the study or experienced health/physical conditions that prevented them from continuing participation.

The data collection technique consisted of primary and secondary data. Primary data were obtained directly from respondents through interviews, observation, and completion of data collection forms. The primary data included name, age, sex, occupation, history of hypertension, smoking history, physical activity, and history of medication use. Secondary data were obtained from existing sources. The researcher acquired data on the number of hypertension patients from Lingkar Timur Community Health Center, Bengkulu City.

The data collection instrument used was a digital blood pressure monitor (Omron brand), which was considered reliable and valid if it produced similar results across two measurements. The Omron digital sphygmomanometer had been calibrated and maintained calibration within the last three years. The instrument validity test was conducted through calibration, while reliability was assessed by performing two blood pressure measurements.

Data analysis in this study used the Shapiro–Wilk test to assess normality and the Wilcoxon test because the data were not normally distributed. This research had undergone ethical review and was declared eligible by the Health Research Ethics Committee of Poltekkes Kemenkes Bengkulu (Ethical Clearance No. KEPK.BKL/207/04/2025). The study also obtained official permission from related institutions, including the Regional Office of National Unity and Politics (KESBANGPOL), the Bengkulu City Health Office (DINKES), and Lingkar Timur Community Health Center, Bengkulu City.

RESEARCH RESULTS

Based on the univariate analysis, the characteristics of respondents as well as blood pressure before and after the therapy are presented in Table 1, 2, and 3.

Table 1 Frequency Distribution of Respondents Based on Their Characteristics

No	Variable	Frekuensi (f)	Persentase (%)
1	**Age**		
	Mean	61.23	100 %
	Min-max	55-69	100 %
2	**Gender**		
	Woman	25	58.1%
3	**Drug Consumption**		
	Regular	16	37.2%
	Irregular	27	62.8%
4	**History of Hypertension**		
	> 5 Years	20	46.5%
	< 5 Years	23	53.5%
5	**Genetic History**		
	Not Available	10	23.3%
	Available	33	76.7%)
6	**Smoking History**		
	No Smoking	27	62.8%
	Smoking	16	37.2%

In Table 1, the results showed that the mean age of the respondents was 61.23 years, with a minimum age of 55 and a maximum age of 69. More than half of the respondents (58.1%) were female. More than half reported irregular medication adherence (62.8%). More than half had a history of hypertension for less than 5 years (53.5%). The majority (76.7%) had a genetic history of hypertension.

Table 2. Distribution of Respondents Based on the Average Blood Pressure Before Treatment in the Lingkar Timur Community Health Center Area, Bengkulu City, 2025

Variabel	Mean	Median	Min-Max	SD	CI For Mean 95%
Blood Pressure Before Treatment (pre)					
Sistolic	159.37	158.00	148-180	8.080	156.89-161.86
Diastolic	91.51	91.00	80-105	5.457	89.83-93.19

Table 2 shows that the mean systolic blood pressure of respondents before the intervention was 159.37 mmHg with a standard deviation of 8.080, and the mean value ranged from 156.89 mmHg to 161.86 mmHg. Meanwhile, the mean diastolic blood pressure of respondents before the intervention was 91.51 mmHg with a standard deviation of 5.457, indicating the average diastolic pressure prior to the therapy.

Table 3. Distribution of Respondents Based on the Average Blood Pressure After Treatment in the Lingkar Timur Community Health Center Area, Bengkulu City, 2025

Variabel	Mean	Median	Min-Max	SD	CI For Mean 95%
Blood Pressure Before Treatment (*post*)					
Sistolic	154.09	154.00	142-166	6.282	152.16-156.03
Diastolic	88.02	88.00	80-95	4.329	86.69-89.36

Table 3 shows that the mean systolic blood pressure of respondents after the treatment was 154.09 mmHg with a standard deviation of 6.282. The mean systolic blood pressure after the treatment ranged from 152.16 mmHg to 156.03 mmHg. Meanwhile, the mean diastolic blood pressure of respondents after the treatment was 88.02 mmHg with a standard deviation of 4.329, and the mean diastolic blood pressure ranged from 86.69 mmHg to 89.36 mmHg.

Based on the bivariate analysis, the results of the normality test and the effect of the therapy are presented in Table 4 and 5.

Table 4 Normality Test

Variabel	*Mean*	*SD*	*CI For Mean 95%*	*P value* (*Shapiro-wilk*)
Blood Pressure *(pre)*				
Sistolic	159.37	8.080	156.89-161.86	0.007
Diastolic	91.51	5.457	89.83-93.19	0.102
Blood Pressure *(post)*				
Sistolic	154.09	6.282	152.16-156.03	0.197
Diastolic	88.02	4.329	86.69-89.36	0.031

In Table 4, the results of the Shapiro–Wilk test show that the pre-intervention blood pressure data have a p-value > 0.05, indicating that the data are normally distributed. Meanwhile, the post-intervention blood pressure data have a p-value < 0.05, indicating that the data are not normally distributed.

Table 5. The Effect of Ergonomic Exercise and Alternate Nostril Breathing Exercise on the Reduction of Blood Pressure in Elderly Patients with Hypertension in the Lingkar Timur Public Health Center Area, Bengkulu City, 2025

Variable	N	*Mean*	*CI 95%*	*Z*	Mean Difference	*p-value*
Blood Pressure						
Sistolic *(pre)*	43	159.37	156.89-161.86	-5.715	5.28	0,000
Diastolic *(pre)*	43	154.09	152.16-156.03		3.49	0,000
Sistolic *(post)*	43	91.51	89.83-93.19	-5.715	5.28	0,000

Diastolic *(post)*	43	88.02	86.69-89.36	3.49	0,000

Based on Table 5, the results of the Wilcoxon Signed Ranks Test show a p-value of 0.000 < α 0.05, indicating that there is a significant difference in the mean systolic and diastolic blood pressure between the pre- and post-intervention measurements. Therefore, it can be concluded that Ergonomic Exercise and the Alternate Nostril Breathing Exercise have an effect and are effective in reducing blood pressure among elderly patients with hypertension in the Lingkar Timur Community Health Center area, Bengkulu City, in 2025.

DISCUSSION

Based on respondent characteristics, the participants in this study were elderly individuals with an average age of 61.23 years. The findings indicate that the respondents were generally categorized as older adults. Hypertension can occur across all age groups, including the elderly, and the risk of developing hypertension increases with advancing age. Therefore, it is essential for individuals to maintain their health status in order to minimize risk factors and prevent hypertension. This is consistent with the study conducted by Andari et al. (2020) at the Elderly Care and Support Center, which found that more than half of respondents aged over 60 years suffered from hypertension. Similarly, Ba'ka et al. (2023), at Yoka Public Health Center, reported that nearly half (44.4%) of respondents aged 55–60 years experienced hypertension.

In this study, more than half (58.1%) of respondents were female. This finding aligns with Salsabila et al. (2023), conducted at Paradise Clinic Surabaya, which reported that 59.2% of hypertension patients were women. This is also supported by Uğur & Uysal (2020) in Turkey, where the majority (72.4%) of respondents with hypertension were female. Furthermore, more than half (62.8%) of respondents reported irregular medication adherence. This result is consistent with Merlis & Alfiah (2022) in Monokwari Regency, which found that 60.2% of respondents took antihypertensive medication irregularly, and Sumiasih et al. (2020) in Prambanan Health Center, where most respondents (65.3%) were non-adherent to medication schedules.

Additionally, more than half (53.5%) of respondents had a genetic history of hypertension. This is supported by Merlis & Alfiah (2022), which revealed that 61.2% of patients had suffered from hypertension for less than five years, and Yuliant et al. (2023) in Tamansari District, which found that 75% of respondents had hypertension for less than five years.

The study results also showed that the majority (76.7%) of respondents had a family history of hypertension. This is consistent with Ashar et al. (2024) in North Securai Village, which reported that 74.3% of hypertension patients had hereditary factors. Similar findings were reported by Setiandari (2022) in Banjarbaru City (71.7%), Stefani et al. (2020) at Bakunase Health Center (79.3%), and Gouda et al. (2024) at Mansoura University Clinic (55.6%).

Regarding smoking behavior, more than half (62.8%) of respondents were non-smokers. This finding is supported by Lamangida et al. (2024) in Gorontalo City (55.5%), Juliana et al. (2024) in Parepare City (82.8%), and Garwahusada & Wirjatmadi (2020) in Central Java (56.5%), all of which reported that most hypertension respondents did not smoke.

The average systolic blood pressure before the ergonomic exercise and alternate nostril breathing intervention was 159.37 mmHg (SD = 8.080), and the average diastolic pressure was 91.51 mmHg (SD = 5.457). After the intervention, the mean systolic blood pressure decreased to 154.09 mmHg (SD = 6.282), and the mean diastolic pressure decreased to 88.02 mmHg (SD = 4.329).

These results are supported by Jumari & Putri (2021) in Citapen Health Center, Bogor, involving 34 respondents who received therapy four times over two weeks. The study reported a reduction in systolic pressure from 155 mmHg to 149 mmHg and diastolic pressure from 90 mmHg to 73.8 mmHg. Similarly, Andari et al. (2020) in Kedungwaduk Village, Sragen, with 46 respondents undergoing therapy three times in three weeks, showed a decrease in systolic pressure from 143.8 mmHg to 137.60 mmHg and diastolic pressure from 90 mmHg to 77.20 mmHg.

The findings of this study indicate a significant reduction in blood pressure among respondents. The average systolic pressure decreased by 5.28 mmHg, and the diastolic pressure decreased by 3.49 mmHg. These results are consistent with Jumari & Putri (2021), who reported a reduction of 6 mmHg systolic and 16.2 mmHg diastolic, as well as Andari et al. (2020), who found decreases of 6.2 mmHg systolic and 12.8 mmHg diastolic.

Statistical analysis demonstrated that ergonomic exercise combined with alternate nostril breathing had a significant effect on reducing blood pressure among elderly individuals with hypertension in the East Ring Area of Bengkulu City, with p-values of 0.000 ($p \leq 0.05$) for both systolic and diastolic pressure. These findings are consistent with Suwanti (2019) in Wening Wardoyo Social Rehabilitation Unit, Central Java ($p = 0.001$), Andari (2020) ($p = 0.001$), Kalaivani et al. (2018) in India ($p = 0.001$), and Hidayati et al. (2024) at Prima Husada Hospital Sukorejo ($p = 0.027$), all of which concluded that alternate nostril breathing and ergonomic exercise significantly reduce blood pressure in hypertensive patients.

CONCLUSIONS AND SUGGESTIONS

The prevalence of hypertension in Bengkulu City reached 50,898 individuals, with the Lingkar Timur Community Health Center (Puskesmas Lingkar Timur) recording 2,906 hypertension cases. The average age of respondents was 61.23 years. More than half of the respondents were female, more than half consumed antihypertensive medication irregularly, had a history of hypertension for less than five years, had a genetic history of hypertension, and the majority were non-smokers.

Before the intervention involving Ergonomic Exercise and Alternate Nostril Breathing Exercise, the average blood pressure among the elderly respondents was 159.37/91.51 mmHg. After the intervention, it decreased to 154.09/88.02 mmHg. This reflects a reduction of 5.28 mmHg in systolic blood pressure and 3.49 mmHg in diastolic blood pressure. These findings indicate a statistically significant effect of the therapy, with a p-value of 0.000, demonstrating that the intervention was effective in lowering blood pressure among elderly patients with hypertension in the area.

Future researchers are encouraged to increase the sample size, incorporate a control group, and further refine and expand the methodology beyond previous studies. This is important to minimize bias, broaden the benefits of ergonomic exercise and alternate nostril breathing therapy, and help create a more conducive environment to support blood pressure reduction.

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