

## Research article

# The Effect of Slow Deep Breathing on Blood Pressure in Elderly People With Hypertension: A Literature Review

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**Abstract.**

According to the 2019 West Java health profile, the prevalence of hypertension is very high in residents aged over 18 years. Hypertension is when the systolic blood pressure is higher than 140 mmHg and the diastolic blood pressure is higher than 90 mmHg. Untreated hypertension can lead to complications such as stroke, kidney damage and heart failure. An example of complementary therapy that may be able to help lower blood pressure is slow deep breathing. This can stimulate parasympathetic nerve activity and inhibit the sympathetic nerves, causing systemic vasodilation, and a decrease in heart rate and contraction power, thereby reducing blood pressure. This study was conducted to identify the effect of slow deep breathing on blood pressure in elderly patients with hypertension. This was a literature review. Journal articles were found by searching in the PubMed, Google Scholar, Science Direct and Garuda databases for articles published in 2016-2021. Articles were selected using the JBI critical appraisal tool for quasi-experimental and randomized controlled trials. Five articles were obtained: three from Indonesia and two international articles. The findings showed that slow deep breathing can help reduce blood pressure in elderly people with hypertension. Therefore, slow deep breathing is a non-pharmacological therapy that can be done by people with hypertension in an effort to lower their blood pressure.

**Keywords:** hypertension, elderly, slow deep breathing

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**Published:** 3 June 2022Publishing services provided by  
Knowledge E

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Selection and Peer-review under the responsibility of the ISGH4 Conference Committee.

## 1. Introduction

Aging or getting old is a condition that occurs in human life. Aging is a process that will be experienced throughout life. Growing old is a natural process which means that a person has started three stages of his life, namely child, adult, and old. These three stages are different both biologically and psychologically. According to law number 13 of 1998, an elderly person is someone who reaches the age of 60 years and over [1].

Elderly people tend to experience health problems caused by decreased body functions due to the aging process. One that arises as a result of aging is starting from physical changes, cognitive changes, psychosocial changes, spiritual changes and

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changes in sexual function and potential. One of the changes that are often experienced is physical changes in the cardiovascular system [2].

Physical changes in the cardiovascular system occur due to a decrease in the elasticity of the aortic wall which causes thickening of the heart valves to occur rigidity. The decrease in contraction, volume leads to a reduced effectiveness of peripheral blood vessels for oxygenation which often occurs in postural hypotension. Increased resistance of peripheral blood vessels causes hypertension or high blood pressure [3].

Hypertension is a high systolic blood pressure of more than 140 mmHg and a diastolic blood pressure of more than 90 mmHg in a state of rest or calm. An increase in blood pressure that lasts for a long time (persistent) can cause problems such as damage to the kidneys (chronic kidney disease), heart (coronary heart disease) and brain (stroke) if not detected early and receive adequate treatment. There are many hypertensive patients with uncontrolled blood pressure and the number continues to increase [4].

According to [5] Hypertension is one of the most common cardiovascular diseases, carried by the community and at all ages but often occurs in adults, especially the elderly. In the elderly, it is said to be hypertension if the systolic pressure is above 160 mmHg and the distolic pressure is above 90 mmHg [6]. This situation causes the heart to work harder to circulate blood throughout the body through the aortic blood vessels. This can damage blood vessels and interfere with blood flow, even causing serious illness and even death [5].

Data from World Health Organization (WHO) in 2015 showed that around 1.13 billion people in the world have hypertension, which means that 1 in 3 people in the world is diagnosed with hypertension. The number of people with hypertension continues to increase every year, it is estimated that by 2025 there will be 1.5 billion people affected by hypertension, and it is estimated that every year 9.4 million people died from hypertension and its complications. [4].

According to Riset Kesehatan Dasar (Riskesmas) in 2018, based on the results of a diagnosis or taking medication and the results of measurements of the population aged over 18 years, 34.1% of Indonesia's population suffers from hypertension. There are 13 provinces whose percentage exceeds the national figure, with the highest in West Java Province at 39.6% of the total population and the lowest in Papua at 22.2% of the total population. [7].

According to Pusat Data dan Informasi Kementrian Kesehatan RI (Pusdatin) health problems in the elderly in 2019, based on the age level of 55-64 years, namely 55.2% of the Indonesian population who suffer from hypertension. For the age level of 65-74

years, 63.2% suffer from hypertension. For the level of age more than 75 years, as many as 69.5% of the Indonesian population suffer from hypertension [8].

According to Profil Kesehatan Jawa Barat in 2019 found 41.6% of hypertension cases where 39.6% were residents with the age of more than 18 years. With the highest case finding in Cimahi at 122.3%. Cirebon is 107.0 % and Tasikmalaya is 100.0%. For the lowest in Indramayu, 13.9% of the population is affected by hypertension [9].

In the elderly, increased blood pressure that lasts for a long time can affect the heart's blood vessels, if it lasts a long time it will cause heart failure followed by shortness of breath. Prolonged hypertension can cause bleeding that results from high pressure in the brain, causing a stroke. The loss of the heart's ability to pump blood back to the heart quickly causes a build-up of fluid in the lungs, legs and other tissues. Fluid in the lungs causes shortness of breath, accumulation of fluid in the legs causes the legs to become swollen or called edema. The high pressure in this disorder causes an increase in capillary blood pressure and pushes fluid into the interstitial space throughout the central nervous system. The surrounding neurons collapse and coma occurs [10].

Based on the data above, hypertension should require intensive treatment. The management of pharmacological and non-pharmacological therapy. Pharmacological therapy given to clients is with drugs for hypertension, namely drugs that include diuretics, adrenergic inhibitors, angiotensin-converting enzyme (ACE-inhibitors) inhibitors, angiotensin II inhibitors, calcium antagonists and vasodilators. Besides that, consuming chemical drugs (a group of drugs that function as anti-inflammatory, analgesic and antipyretic) in the long term can cause other disturbances in body functions where those who consume more than three times per week are six times at risk of suffering from chronic kidney failure. The main non-pharmacological therapy is to change lifestyle and complementary therapy so that it can lower blood pressure. Lifestyles that must be improved include losing weight, reducing alcohol consumption, stopping smoking, avoiding stress, increasing physical activity such as exercise, reducing saturated fat consumption and reducing salt intake. [10].

In addition, non-pharmacological therapy also can be used with complementary therapies such as health acupuncture, hypnotherapy, aromatherapy, herbal therapy and relaxation techniques [11]. According [12] relaxation is an intervention that can be done for hypertension therapy by reducing the pressure of symptoms felt by a person in dealing with situations, reducing heart rate and blood pressure and decreasing muscle tension, one of which is included in exercise and relaxation. The relaxation is slow deep breathing. The management of slow deep breathing was chosen because it can be done independently and is easier to practice than other non-pharmacological therapies. Even

this therapy does not take a long time to be able to reduce the adverse effects of pharmacological treatment [13].

According [11] slow deep breathing or relaxation of deep and slow breaths is a respiratory system in the form of a state of inspiration and expiration of breathing with a respiratory frequency of 6-10 times per minute resulting in an increase in cardiopulmonary strain. Slow deep breathing is a non-pharmacological therapy that can trigger an increase in baroreflex sensitivity and reduce sympathetic activity and chemoreflex activation so that it can have a beneficial effect on lowering blood pressure in hypertensive patients, namely making the body calm and lowering blood pressure.

Slow deep breathing can lower blood pressure and can be done independently. In the independence of the patient can be assisted by health workers, especially nurses. Nurses have a role as a care giver who takes care of someone, especially the elderly who need special assistance and attention in carrying out their daily lives. Nurses can make patients independent, especially elderly patients, this is in accordance with Orem's theory which states that the role of nurses in efforts to overcome health problems in the elderly is to provide nursing care to help maintain and improve health, as well as improve their ability to take preventive measures and care for the elderly independently. [2].

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The results of research by [14] showed that there was a significant decrease between systolic and diastolic pressure before and after performing music therapy with slow deep

breathing on 15 respondents who intervened for 90 days getting a decrease in blood pressure of 13 mmHg both from systolic and diastolic pressure. The result of research by [15] showed that there was a decrease in blood pressure after the slow deep breathing intervention was given to 17 respondents for 21 days with a systolic blood pressure of 11.18 mmHg with a p value of 0.000 ( $p < 0.05$ ) meaning that there was a difference in systolic blood pressure before and after the intervention. . The results of statistical tests for diastolic blood pressure with a value of  $p = 0.166$  ( $p > 0.05$ ) so that it was concluded that there was no significant difference between diastolic blood pressure before and after the intervention. According to the results of a study conducted by [16] in 22 respondents who suffered from hypertension, there was a significant decrease in the respondent's blood pressure on day 3 to day 5 after being given slow deep breathing intervention. 2.79 mmHg both systolic and diastolic blood pressure.

Based on the data and problems above, it is explained that the results of previous studies there are differences in the scale of decreasing blood pressure that are different from the effects of the slow deep breathing intervention, the researchers are interested in conducting a literature review with these problems to find out how much the average decrease in blood pressure is after the intervention. slow deep breathing on blood pressure in elderly patients with hypertension. Therefore, the topic in this literature review is the effect of slow deep breathing on decreased blood pressure in elderly people with hypertension.

## 2. Methods

This research method uses a literature review. The sample in this study amounted to 5 journals sourced from reputable academic databases including google scholar, garuda, science direct, PubMed using the keywords "Hypertension", "Slow Deep Breathing", "Elderly". Inclusion criteria in this study: English and Bahasa Indonesia with PICOST approach namely *Population*: Elderly People with Hypertension, *Intervention*: Slow Deep Breathing, *Comparison*: None, *Output*: Decreased Blood Pressure, *Study*: Literature Review, *Time* : 2016 - 2021 (last 5 years); full text National Journal and International Journal Indexed Sinta or registered with ISSN. While the exclusion Criteria in qualitative research (thisresearch is quantitative).

This literature research is selected based on inclusion criteria, the journals published between 2016-2021, indonesian and English, full text, national journals and indexed international journals. Sinta and ScimagoJr. In conducting a search of this journal researchers used the keywords "Effect Slow Deep Breathing OR Hypertension / Blood

Pressure”, "Effect Deep Breathing OR Hypertension / Blood Pressure”, "Effect Slow Breathing OR Hypertension / Blood Pressure”. Journal searches were conducted on the academic databases of Garuda, Google Scholar, Pubmed and Science Direct.

The search results of articles from the academic database obtained 12,963 articles. Then the article checked its duplication as many as 20 articles, so that the number of articles after being examined 4345 articles. The number of articles eliminated as 4285 articles because it is not free access, not full text, not in English and Indonesian, does not match the title. Obtained the number of articles filtered based on inclusion criteria as many as 60 articles. Articles that are eliminated because they do not fit the inclusion criteria of as many as 55 articles. The final results of the selection were obtained by 5 journal articles indexed by Sinta and ScimagoJr with the acquisition of 2 international journal articles and 3 national journal articles.

### 3. RESULTS

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### 4. DISCUSSIONS

#### 4.1. Common Characteristics in Study Selection

TABLE 1: Common Characteristics In Study Selection.

No	Category	n	%
1	Year of Publication 2018 2019	3 2	60% 40%
	Total	5	100%
2	Variable Variabel <i>Slow deep Breathing</i> Variable Hypertension in the elderly	5 5	50% 50%
	Total	10	100%
3	Research Design <i>Quasi Eksperimental Studies Randomized Controlled Trial Studies</i>	3 2	60% 40%
	Total	5	100%

## 4.2. Identify Research Similarities and Differences Previous Research

The results of the review from 5 journals, the majority of which were obtained by the population are elderly people with hypertension, using a *sphygmomanometer* tool that has been calibrated as a pre and post blood pressure measurement tool after the conduct of *slow deep breathing* intervention, the working principle of each therapy in the journal has something in common that lowers the blood pressure of elderly people with hypertension. In addition to the equation there are several differences from the length of time therapy, place, number of respondents, respondent criteria, sampling techniques, as well as research designs used in Research journals.

## 4.3. Results of Analysis and Synthesis From Research Previous Research

The results of the literature review analysis concluded that *slow deep breathing* is effective for lowering blood pressure in people with hypertension. This statement is supported by the results of research conducted by [12]; [17]; [18]; [19]; [20].

Research conducted by [17] that the group who get *slow deep breathing* treatment for 4 days with a frequency of 2 times in one day, with respondents can do as much as 13 times for *slow deep breathing* intervention in a span of 6 times per minute and rest time for 10 seconds for 15 minutes given. The number of respondents as many as 16 people who do *slow deep breathing* with the majority of elderly respondents with a family history of hypertension. In this study, the average difference in systolic blood pressure decreased by 2.37 mmHg and diastolic blood pressure got an average difference of 3.87 mmHg.

In study conducted by [18], the intervention group received *slow deep breathing* treatment 3 times within 3 weeks with a duration of 15 minutes to intervene. *slow deep breathing*. The number of respondents as many as 30 people divided into 15 intervention groups who were given *slow deep breathing* intervention treatment and 15 people control group only treatment from public health center. The majority of female respondents with advanced age criteria, had a family history of hypertension. With an average difference of decrease in the intervention group for systolic blood pressure of 15.33 mmHg and for diastolic blood pressure got an average difference of 10.67 mmHg while The results of the control group received an average difference in systolic blood pressure of 4.66 mmHg and diastolic blood pressure of 3.34 mmHg.

Research conducted by [12] that the group who get *slow deep breathing* treatment for 4 weeks, every week is done 4 times therapy, in doing *slow deep breathing* interventions. Twice a day with 10 minutes to intervene. The number of respondents was 18 people who intervened. With the majority of respondents are women with advanced age and have a history of smoking. So that the average difference in blood pressure obtained in systolic blood pressure after intervention of 20 mmHg for systolic pressure and 10 mmHg for the difference in pressure distolic.

Research conducted by [19] that who received *deep breathing* treatment for 15 minutes per day for 8 weeks was good for the intervention group / treatment and the control group. Respondents in this study journal as many as 117 patients with 87 patients who qualified and further divided into two groups, namely 42 intervention groups and 45 people. control group. The majority of respondents with the elderly category with an average age of 61 years. In this study, the difference in blood pressure decreased after an 8-week intervention of 8.3 mmHg for systolic pressure and 5.6 mmHg for distolic pressure. As for the control group who received the treatment to listen to music on CD alone, the difference was 10.5 mmHg for systolic blood pressure and 5.2 mmHg for distolic blood pressure.

Research conducted by [20] that the group that did slow breathing for 6 breaths with an inspiring length of 4 seconds and an expiration time of 6 seconds during 15 minutes of intervention per day for 8 weeks for both the intervention group and the control group. The respondents in this study were 32 people. The majority of respondents with the elderly category with an average age of 61 years. In this study, the intervention group's blood pressure reduction resulted in 19.6 mmHg for systolic pressure and 3.8 mmHg for distolic pressure. The session for the control group was 9.8 mmHg for cytokinetic pressure and there was no significant change in distolic pressure.

Based on the observations of researchers in the entire journal, researchers obtained that some of the respondents to this study were women with advanced age. This is supported by the theory of Ardiansyah [21] that factors, sex and age are one of the risk factors for hypertension. A family history of hypertension will be much more at greater risk than a family of having no previous history of hypertension. Women with advanced age will experience changes in their body systems. One of them is hormonal changes, women have estrogen and progesterone hormones that serve as protection from blood vessel tone, in old age these hormones experience a decrease in number, the reduction of these hormones can cause a decrease in blood vessel tone that can cause an increase in peripheral blood pressure so that it can cause hypertension. The more age there will be changes in the physical elderly, one of which is a physical change



in the cardiovascular system where in old age there is a decrease in strength. Heart muscle, heart muscle experiencing thickening and stiffness, artery walls experience a decrease in smoothness so that the heart will pump strongly and blood pressure increases [22].

In a research journal conducted by [12] showed that respondents mostly smoked. Smoking is one of the risk factors for hypertension is supported by [23] that smoking is one of the causes of hypertension. Chemicals released from burning tobacco are harmful to blood cells and organs such as the heart. Nicotine content in cigarettes can stimulate the release of catecholamines, myocardial irritability so that there is an increase in heart rate and vasoconstriction which will then increase blood pressure [21].

The mechanism of *slow deep breathing* exercises in the entire journal research obtained that can affect the decrease in blood pressure is strengthened by the theory of [14], which says that slow deep Breathing can activate an increased reflex baroreceptor which is the primary reflex for determining the control and regulation of heart rate and blood pressure. These impulses will stimulate parasympathetic activity to inhibit the work of the heart organ and inhibit the sympathetic nerve center whose function is to speed up heart rate and blood vessel contraction. . So that there can be a decrease in the speed of the heart pump and make the volume of blood pressure decrease as well as a decrease in blood pressure.

#### 4.4. Average Decreased in Blood Pressure After Slow Deep Breathing Intervention In Previous Research

Based on the table above, the average difference in blood pressure from the entire journals above is 13.12 mmHg for systolic pressure and 6.78 mmHg for diastolic pressure. Long *slow deep breathing* intervention that experienced a decrease in blood pressure that is quite high is from research that conducts *slow deep breathing* intervention for 4 weeks to 8 weeks. The length of duration in its application that gets a fairly high blood pressure reduction result is with a duration of 2x1 days each intervention for 10 minutes.

## 5. Conclusions

Conclusions that can be drawn are:

1. (a) i. Similarity of 5 studies conducted by review, all respondents are elderly, the entire study conducted states there is a *slow deep breathing* influence on the decrease in blood pressure of elderly people with hypertension with

TABLE 2: Average Decreased In Blood Pressure After Slow Deep Breathing Intervention In Previous Research.

Research Journal	Length Research	Of Number Of Interventions	Of Duration	Decrease in Systolic Pressure (mmHg)	Decrease In Diastolic Pressure (mmHg)
Research Of Jurnal 1	4 Day	2 x 1 Day	1 x 1 day during 15 minutes	2,37 mmHg	3,87 mmHg
Research Of Jurnal 2	3 Week	3 x 1 Week	1 x 1 day during 15 minutes	15,33 mmHg	10,67 mmHg
Research Of Jurnal 3	4 Week	4 x 1 Week	2 x 1 day during 10 minutes	20,00 mmHg	10,00 mmHg
Research Of Jurnal 4	8 Week	7 x 1 Week	1 x 1 day during 15 minutes	8,30 mmHg	5,60 mmHg
Research Of Jurnal 5	8 Week	7 x 1 Week	1 x 1 day during 15 minutes	19,60 mmHg	3,80 mmHg
<b>Average decrease in blood pressure (mmHg)</b>				13,12 mmHg	6,78 mmHg

the equation of the mechanism of work of therapy that greatly affects the decrease in blood pressure. *Slow deep breathing* can activate increased baroreceptor reflex which is the primary reflex for determining heart rate and blood pressure control and regulation. These impulses will stimulate parasympathetic activity to inhibit the work of the heart organ and inhibit the sympathetic nerve center whose function is to speed up heart rate and contraction of blood vessels. So that there can be a decrease in the speed of the heart pump and make the volume of blood pressure decrease and decrease blood pressure.

- ii. The difference from the 5 studies conducted by *the review* is from the length of therapy carried out, the place, sampling techniques, the number of respondents, and when making interventions there are those that are done independently.
- iii. There was an average decrease in blood pressure in elderly people with hypertension with an average difference in blood pressure from the whole journal of 13.12 mmHg for systolic pressure and 6.78 mmHg for diastolic pressure.
- iv. The length of *slow deep breathing* intervention that decreased blood pressure quite high is from research that intervened for 4 weeks to 8 weeks.

- v. The length of the duration of the slow deep breathing intervention with a decrease in blood pressure is quite high is from the study that intervened with a duration of 2x1 days each intervention for 10 minutes.

Research with this literature review method can be used as information and research material by further researchers and it is recommended that further researchers research and complete materials that are not reviewed in this study and intervene with a different time duration from this study.

## Acknowledgement

This article is part of a scientific writing coursework. No funds received during writing process. Thanks to my family for their support. We also thanks to Mr Achmad Setya Roswendi and Mr Lina Safarina for their guidance and comments that greatly improve this research. References

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