Open Access Research Journal of
Science and Technology
Journals home page: https://oarjst.com/
ISSN: 2782-9960 (Online)

(RESEARCH ARTICLE)

Effectiveness of slow deep breathing therapy on lowering blood pressure in hypertensive patients: A case study

Rezi Alifia Rosyida [1,*], Okti Sri Purwanti [2] and Wahyuni [3]

[1] *Department of Nursing Science, Faculty of Health Science, Universitas Muhammadiyah Surakarta, Surakarta, Indonesia.*
[2] *Department of Medical Surgical Nursing, Faculty of Health Sciences, Universitas Muhammadiyah Surakarta, Surakarta, Indonesia.*
[3] *Department of Medical Surgical Nursing, Karanganyar Regional General Hospital, Surakarta, Indonesia.*

Open Access Research Journal of Science and Technology, 2024, 10(01), 065–070

Publication history: Received on 06 December 2023; revised on 27 January 2024; accepted on 30 January 2024

Article DOI: https://doi.org/10.53022/oarjst.2024.10.1.0025

Abstract

Introduction: Hypertension is a cerebral vascular disorder in the form of narrowing of cerebral blood vessels, resulting in reduced oxygen and nutrient supply to the brain. It is characterized by an increase in systolic blood pressure >140 mmHg and diastolic pressure >90 mmHg. Non-pharmacological management is needed to be applied in lowering blood pressure. Slow deep breathing therapy exercises are done by breathing long and deep breaths slowly can stimulate the secretion of endorphins neurotransmitters in the autonomic nervous system which has an effect on decreasing the work of sympathetic nerves, increasing the work of parasympathetic nerves whose effects can affect heart rate to be slow and also vasodilation occurs in blood vessels.

Objective: To lower blood pressure in hypertensive patients by using slow deep breathing exercises.

Methods: The method used in this study used a case study with pre and post intervention, patients were given slow deep breathing exercises by breathing in through the nose for 3 seconds until they felt that the stomach expanded then held their breath for 3 seconds, then exhaled slowly through the mouth for 6 seconds, and repeated all steps for 15 minutes.

Results: Obtained results of a decrease in blood pressure in patients after being given slow deep breathing exercises.
Conclusion: Slow deep breathing therapy exercises with appropriate methods and procedures can be an alternative to lower blood pressure in hypertensive patients

Keywords: Blood pressure; Breathing exercise; Hypertension; Slow deep breathing

1. Introduction

Hypertension is a form of disorder in the cerebral vascular in the form of narrowing of cerebral blood vessels which results in the supply of oxygen and nutrients to brain tissue decreased or blocked. According to The Seven Joint National Committee (JNC-VII), a person's blood pressure limit is said to be hypertensive when systolic pressure >140 mmHg and diastolic pressure >90 mmHg (1). Hypertension is high systolic blood pressure, which is more than 140 mmHg and diastolic blood pressure more than 90 mmHg in a resting or calm state. A long-lasting (persistent) increase in blood can lead to problems such as damage to the kidneys (chronic kidney disease), heart (coronary heart disease) and brain (stroke) if not detected early and get adequate treatment. There are many people with hypertension with uncontrolled blood pressure and the number continues to increase (2). Hypertension is a major risk factor for causing global disease problems (3).

* Corresponding author: Rezi Alifia Rosyida

The number of adults with hypertension will increase from 594 million in 1975 to 1.13 billion in 2015, with the increase occurring mostly in low- and middle-income countries. This increase is mainly due to an increase in hypertension risk factors in such populations (4). Based on the Ministry of Health in 2017 the prevalence of hypertension will increase sharply, and it is estimated that by 2025, 29% of adults worldwide will be affected by hypertension (5). High blood pressure causes about 8 million deaths each year, and 1.5 million people die from high blood pressure in Southeast Asia, which could increase the burden of 4,444 health care items. In addition, hypertension is more common at the age of 35-44 years (6.3%), 45-54 years (11.9%), and 55-64 years (17.2%). According to the economic status of people, the highest rates of hypertension are in the lower middle (27.2%) and middle (25.9%) (6) ranges. According to Riskesdas data (2018) the number of people with hypertension in Indonesia reached 36, an increase of 34.1% from year to year. Compared to the data from Riskesdas (2013), this incidence rate has increased quite high, The results showed that according to the blood pressure measurement of Indonesians aged 18 years and over, up to 25.8% of people have high blood pressure, and blood pressure measurements have increased significantly. The value of the population over 60 years accounted for 25.8%.

Hypertension is often found in the elderly and is a major contributing factor to stroke and heart disease (9). Hypertension is a cardiovascular risk factor with direct effects on the heart and large blood vessels. Not only does it affect the development of heart failure, atrial fibrillation, ischemic heart disease, and aortic valve disease, but poor blood pressure control also carries a poor prognosis for patients with heart disease (10). Hypertension has a direct relationship with circulation, breathing, and the function of vital organs (11). Given the high prevalence rate, treatment of hypertension is necessary, not only to reduce blood pressure levels but also to prevent the development of cardiovascular disease, cerebrovascular disease, and kidney disease (12).

Pharmacological therapy for hypertensive patients is carried out by taking antihypertensive drugs, maintaining adherence to taking drugs regularly and according to the recommended dose (13). The current strategy to prevent further complications of hypertension is to encourage medication adherence and lifestyle changes (14). Nonpharmacological interventions that modify lifestyle can lower blood pressure (15). Non-pharmacological therapies that can be done by people with hypertension are controlling food and sodium intake, losing weight, limiting alcohol and tobacco consumption, doing sports exercises, foot reflexology therapy and Slow Deep Breathing Exercise. Slow deep breathing can be a non-pharmacological alternative therapy for people with hypertension in addition to lifestyle modification. Slow deep breathing exercises are easy for people of all ages to do and don't cost much (16).

Slow Deep Breathing Exercise is a breathing technique with a breathing frequency of less than 10 times per minute and a long breathing phase. The benefits of Slow Deep Breathing Exercise are reducing pain and stress levels, controlling tension and fear. Slow deep breathing exercises can reduce oxygen consumption, metabolism, breathing frequency, heart frequency, muscle tension and blood pressure (17). Doing slow deep breathing can give the body diaphragmatic breathing and can dramatically change the physiological life because the relaxation centers in the brain are activated (1). Slow deep breathing technique can stimulate the secretion of endorphins neurotransmitters in the autonomic nervous system which has an effect on decreasing the work of sympathetic nerves, increasing the work of parasympathetic nerves whose effect can affect heart rate to be slow and also vasodilation occurs in blood vessels (18).

According to research conducted by Chaddha et al., (2019) slow deep breathing intervention showed a steady decrease in blood pressure. Slow deep breathing is an intervention that can be used for low-risk hypertensive and prehypertensive patients who are reluctant to start treatment (14). The results of the study conducted by Ambarwati &; Ariyani, (2021) also showed that slow deep breathing exerts a significant effect on the blood pressure of patients with hypertension (19). Slow Deep Breathing exercises can also reduce average arterial pressure or Mean Arterial Pressure (MAP) and increase Heart Rate Variability (20).

According to observations in Cempaka room 3 of RSUD Karanganyar Regency on August 20-25, 2023, there were 8 patients with medical diagnoses of hypertension. Management of hypertensive patients treated in Cempaka room 3 of RSUD Karanganyar Regency consists of pharmacological management by administering antihypertensive drugs and low-salt diet education. However, the nurse has not applied non-pharmacological therapy to hypertensive patients in Cempaka room 3 of RSUD Karanganyar Regency. The purpose of this slow deep breathing intervention is to help patients relax and lower blood pressure in patients with hypertension. Based on the above phenomenon, researchers are interested in applying the results of research on the effectiveness of slow deep breathing therapy to help lower blood pressure in patients with hypertension in Room Cempaka 3 RSUD Karanganyar Regency.

2. Method

In this case study, the author uses descriptive methods of pre and post experiments, where patients are carried out slow deep breathing exercise therapy. In research using a digital sphygmomanometer device to measure the patient's blood pressure. The implementation of slow deep breathing exercises is carried out 30 minutes before the administration of phamakological therapy. Respondents are advised to calm down and relax 15 minutes before taking a blood pressure measurement. Then researchers measured blood pressure pre-intervention, which is 1 minute before doing slow deep breathing exercise instructions. Researchers instructed respondents to inhale through the nose for a matter of 3 seconds until they felt that the stomach expanded and then hold their breath for 3 seconds. The final step is to exhale slowly through the mouth for 6 seconds. Repeat all steps for 15 minutes. After that, researchers remeasured blood pressure post intervention, which was 1 minute after giving slow deep breathing exercises. Slow deep breathing exercises are performed 1 time a day for 3 consecutive days. This case study was conducted on August 20-25, 2023 in Cempaka Room 3 of RSUD Karanganyar Regency by taking 3 patients with medical diagnoses of hypertension. The focus of the study was to help lower blood pressure in patients with hypertension. The criteria for sample inclusion are patients with medical diagnoses of hypertension, have blood pressure above normal (>140/90 mmHg), and patients with composmentis awareness. The exclusion criteria in this study were patients who refused to be sampled, patients who did not have a medical diagnosis of hypertension, patients with GCS under 14.

3. Case report

3.1. Patient Mrs. G

A 63-year-old female patient, the last education of an elementary school patient, the work of a farmer patient, was treated in Cempaka Room 3 of Karanganyar Regency Hospital on August 20, 2023 with complaints of neck pain. The patient is in a state of composmentis with GCS E4V5M6. When the patient's blood pressure assessment is 180/98 mmHg. The patient appears to be holding a painful neck. The patient said he had a history of hypertension for more than 6 years. The patient said he had never received information about non-phamacological therapy for hypertension.

3.2. Patient Mrs. T

A 59-year-old female patient, whose last high school education, the patient is self-employed, was treated in Cempaka Room 3 of RSUD Karanganyar Regency on August 21, 2023 with complaints of high blood pressure, dizziness, weakness in her right hand and foot. When the patient's blood pressure assessment was 195/107 mmHg. Patient's muscle strength 44|55. The patient said that he had a history of high blood pressure in the last 3 years but took high blood pressure medication when the patient felt unwell or when he found out that his blood pressure was high. Patients said they did not know of non-pharmacological therapies with breathing that can help lower blood pressure.

3.3. Patient Mr. A

A 55-year-old male patient, his last S1 education, the patient's job was a teacher, was treated in Cempaka Room 3 of RSUD Karanganyar Regency on August 21, 2023 with complaints of high blood pressure, often tingling right hands and feet. When the patient's blood pressure assessment was 178/98 mmHg, the patient looked weak, the patient seemed to hold his hands, the patient said he had a family history of hypertension and only this time his blood pressure was high. The patient said he did not know how to lower blood pressure non-pharmacologically.

4. Results and discussion

After reviewing and collecting data on patients in Cempaka Room 3 of RSUD Karanganyar Regency, 3 patients were obtained in accordance with the criteria for inclusion and exclusion of the study. Patients with medical diagnoses of hypertension, have elevated blood pressure, and patients with composmentis consciousness. The patient is given slow deep breathing exercises. Researchers instructed patients to inhale through the nose for a matter of 3 seconds until they felt that the stomach was expanding and then hold the breath for 3 seconds. The final step is to exhale slowly through the mouth for 6 seconds. Repeat all steps for 15 minutes. After that, researchers took repeated blood pressure measurements 1 minute after giving slow deep breathing exercises. Slow deep breathing exercises are performed 1 time a day for 3 consecutive days. Slow deep breathing exercises are given 30 minutes before getting pharmacological therapy.

Table 1 Characteristics of Respondents

Characteristic	Patient I	Patient II	Patient III
Age	63 year	59 year	55 year
Gender	Female	Female	Male
Occupation	Farmer	Wiraswasta	Teacher
Education	Elementary School	Senior High School	Bachelor
History of Hypertension	Yes	Yes	Yes
History of Hypertension Treatment	Yes	Yes	No
Complaints of weakness, headache	Yes	Yes	Yes

Table 2 Progress of Lowering Patient's Blood Pressure

Patient	Day To	Pre	Post
Patient I	1	173/98 mmHg	135/90 mmHg
	2	168/92 mmHg	142/89 mmHg
	3	158/87 mmHg	128/83 mmHg
Patient II	1	189/105 mmHg	143/94 mmHg
	2	173/92 mmHg	134/87 mmHg
	3	168/95 mmHg	128/82 mmHg
Patient III	1	169/100 mmHg	131/84 mmHg
	2	157/92 mmHg	129/83 mmHg
	3	148/90 mmHg	124/75 mmHg

After reviewing and collecting data on patients in Cempaka Room 3 of RSUD Karanganyar Regency, 3 patients were found in accordance with the criteria for inclusion and exclusion of the study, patients with medical diagnoses of hypertension, had blood pressure above normal blood pressure measurement repeated 1 minute after giving slow deep breathing exercises. Slow deep breathing exercises are performed 1 time a day for 3 consecutive days. Slow deep breathing exercises are given 30 minutes before getting pharmacological therapy.

The results of the application of slow deep breathing exercises in patient I, with a diagnosis of hypertension on the first day of the patient's blood pressure before exercise is 173/98 mmHg, after exercise the patient's blood pressure is 135/90 mmHg. On the second day of slow deep breathing exercise, the patient's blood pressure was 158/93 mmHg to 142/89 mmHg. On the third day of exercise, the patient's blood pressure before the action was 157/87 mmHg, after exercise it became 128/83 mmHg.

In patient II, the first day of slow deep breathing exercise the patient's blood pressure has not been exercised 189/105 mmHg, after exercise to 143/94 mmHg. On the second day, the patient's previous blood pressure was 173/92 mmHg to 134/87 mmHg. On the third day of slow deep breathing, the patient's blood pressure was initially 168/95 mmHg after exercise to 128/32 mmHg.

In patient III, the application of slow deep breathing exercises on the first day of the patient's blood pressure was 169/100 mmHg to 131/84 mmHg. On the second day, the patient's blood pressure was 157/92 mmHg to 129/83 mmHg. On the third day, the patient's blood pressure before exercise was 148/90 mmHg, after slow deep breathing exercise became 124/75 mmHg.

Based on the table above, it can be concluded that there is a decrease in pressure from the first day to the third day. This is in line with research conducted by N. Dewi et al. (2022) that there was a decrease in systolic and diastole blood

pressure after the implementation of slow deep breathing for 3 days in activity intolerance nursing problems with exercise program management interventions (21). In a study conducted by R. S. U. Muchtar et al. (2022), pre and post blood pressure groups in the intervention group before and after therapy was given, there was an effect of slow deep breathing therapy on reducing blood pressure in patients with hypertension. This is supported by another study conducted by Ikhwan et al (2019) that there is a significant influence of giving slow deep breathing exercises in lowering blood pressure (23).

In a study conducted by Putu & Miranti (2019), there was an effect of slow deep breathing on diastole blood pressure, pretest and posttest in the intervention group. The decrease in blood pressure was more in the intervention group that received treatment in the form of gymnastics and slow deep breathing, compared to the control group that only received gymnastics alone. Slow deep breathing has an effect on the nervous system and affects blood pressure regulation (24). In line with research conducted by Hoesny & Alim (2019), there are changes in blood pressure before and after deep breath therapy. This intervention is easy for nurses to learn and implement, so it can be a nurse's independent intervention for hypertensive patients (25).

The results of a case study conducted in Cempaka Room 3 of RSUD Karanganyar Regency found that after the intervention of slow deep breathing exercises by breathing in through the nose for a matter of 3 seconds to feel that the stomach expands then hold the breath for 3 seconds. The final step is to exhale slowly through the mouth for 6 seconds. Repeat all steps for 15 minutes. Slow deep breathing exercises are carried out 2 times a day for 5 consecutive days, so the results of blood pressure in hypertensive patients have decreased.

5. Conclusion

Slow deep breathing exercises to lower blood pressure in hypertensive patients by breathing in through the nose for a matter of 3 seconds until you feel that the stomach expands and then hold your breath for 3 seconds. The last step is to exhale slowly through the mouth for 6 seconds and repeat all steps for 15 minutes to get effective results for lowering blood pressure in hypertensive patients.

Compliance with ethical standards

Disclosure of conflict of interest

Researchers had no problems in this study

Statement of ethical approval

All respondents received an explanation of the purpose of this study, namely to determine the effectiveness of slow deep breathing in helping lower blood pressure in hypertensive patients. Informed consent was obtained from each participant prior to the study. Respondents are allowed to withdraw from the study at any time.

Statement of informed consent

Visited prospective respondents and were given an explanation of the purpose of this study, which was to test the effectiveness of slow deep breathing in lowering blood pressure in hypertensive patients. Informed consent was obtained prior to the study and respondents were allowed to resign at any time.

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