Pranayama breathing exercise as a nursing intervention to reduce blood pressure in families with hypertension

Tri Mariha¹*, Tri Widyastuti Handayani²

¹. Bachelor of Nursing, Faculty of Nursing, Universitas Indonesia, Kampus UI Depok, Depok, 16424, Indonesia
². Community Nursing Department, Faculty of Nursing, Universitas Indonesia, Kampus UI Depok, Depok, 16424, Indonesia

*E-mail: trimariha@gmail.com

Abstract

Objective: Adults in urban areas are at risk of developing hypertension. This study aimed to determine the effectiveness of the Pranayama breathing exercise as a relaxation technique for reducing blood pressure in a patient with hypertension.

Methods: The patient performed a Pranayama breathing exercise as a family nursing intervention. This exercise comprised full yogic breaths (Dhîirga Swasam), respiratory breaths (Ujjayi), strong blowing breaths (Kapalabhati), alternate nasal breaths (Anuloma Viloma), and tooth breaths (Sitkari). The exercise was done 1–2 times per week for 25 minutes each session.

Results: The patient exhibited reduced blood pressure readings, from 200/120 mmHg on May 2, 2017 to 170/90 mmHg on June 7, 2017.

Conclusion: The results of this study suggested that the Pranayama breathing exercise, performed 1–2 times per week, could be an effective non-pharmacological treatment for hypertension. Family nurses should therefore use Pranayama a nursing intervention for patients with hypertension. Additional studies, involving more patients, are needed to comprehensively examine the ability of Pranayama breathing exercises for reducing blood pressure.

Keywords: adult, hypertension, Pranayama breathing exercise.
Introduction

Urbanization is an important issue faced by developing cities. Urbanization or individual migration, from rural to urban areas, is a major challenge because this process carries significant implications and pressures related to social, ecological, and health sustainability, and also impacts the well-being of the global population. Currently, up to 54% of the population lives in urban areas, and this percentage is projected to increase to 66% by 2050.

Rapid urbanization negatively impacts health. It is associated with poverty, decreased availability of clean water, increased air pollution, noise, and inadequate housing that increases the risk of health problems in urban communities. Health problems in urban communities are also influenced by adaptation of a Western lifestyle wherein city dwellers are more obese, with increased risk of chronic diseases. City residents tend to be less physically active, smoke more, and have higher levels of stress. Thus, adults in urban areas are at increased risk for health problems.

One such health problem that can arise in city-dwelling adults is hypertension. There are three factor classes that increase the risk of hypertension. These include biological, environmental, and behavioral factors. Biological risk factors include genetic and family transition experiences. Here, transitioning from one stage of development to another induces stress and metabolic changes that increase the risk of obesity and related diseases. Environmental factors include increased crime and exposure to urban pollution, communication problems with children, and economic factors, such as those caused by career changes. These stressors are known to contribute to the development of various diseases. The last factor class is lifestyle and includes eating habits (particularly those that encourage intake of a low-nutrient and high fat diet), maintaining a sedentary lifestyle, and smoking. Considering its dire consequences, hypertension in adults should be a preeminent concern for healthcare professionals.

The negative effects of hypertension can be experienced by patients themselves, by patients’ families, and even by the country as a whole. Patients with hypertension may experience more severe disease-related complications, such as myocardial infarction, cardiovascular failure, renal failure, stroke, visual impairment, and death. Hypertension also negatively impacts families, increasing the risk of other family members experiencing hypertension. This is because health problems in one family member often affect other family members. These effects can be physical, emotional, economic, or spiritual. For the country as a whole, hypertension negatively impacts the economy, with approximately 23 billion rupiahs are spent to address issues resulting from hypertension in Indonesia.

Several efforts seek to preventing the negative effects of hypertension in urban areas in Indonesia. These efforts are integrated into the role of the public health nurse (Perkesma). Based on the Decree of the Minister of Health of the Republic of Indonesia No 279 of 2006, Perkesmas seek to improve the community's independence for overcoming community health problems, including hypertension. Perkesmas use family nursing care as a means of addressing this goal.

Family nursing care was provided to one such family whose matriarch, Mrs. S suffered from hypertension. The family lived within the service coverage area of UPT Puskesmas Cimanggis, Depok, West Java. Her baseline blood pressure readings were 200/120 mmHg on May 2, 2017 and 180/120 mmHg on May 4, 2017. Mrs. S reported feeling dizzy and experienced neck pain almost every day. Assessment of potential stressors revealed that she considered her children to be short-term stressors, and economic problems as long-term stressors.

Deep yoga breathing is considered a non-pharmacological therapy for reducing blood pressure, according to the Nursing Intervention Classification (NIC) system. Deep yoga breathing is alternatively known as the Pranayama breathing exercise. The benefits of Pranayama breathing on blood pressure are evidenced by several studies. One study by Smita et al. revealed a significant reduction in blood pressure and pulse rate after Pranayama breathing exercises were carried out, in a cohort of 60 students, for 4, 8 and 12 weeks. Armandeep, Prksha and Divya found that 30 patients, aged 30–70 years, experienced significantly decreased blood pressure after performing pranayama breathing exercises twice daily for 5 minutes each session, for 10 days. Similarly, Mahour and Verma (2017), Sharad (2016), and Bhavanani, Sanjay, and Madanmohan (2011) found that reductions in blood pressure occurred after respondents performed Pranayama breathing exercises.

These effects could be due to increased vagal tone, decreased sympathetic nerve activity, increased parasympathetic nerve activity, and decreased catecholamine secretion in the blood, leading to decreased blood pressure. Given these past findings, we attempted to treat our patient’s hypertension by providing family nursing care, featuring a Pranayama breathing exercise intervention.

Methods

This case study used a family nursing approach from assessment to evaluation. The assessment stage consisted of a family assessment based on Friedman’s format, including repeated assessment of our patient’s blood pressure. Next, we analyzed the data and determined that ineffective health maintenance care, specifically relating to hypertension, was the main nursing diagnosis for this particular family. We then formulated a nursing care plan to address the problem.
The first nursing care session occurred on May 9, 2017. Here, we helped the family recognize the problem, make a decision to address the problem, and taught the family how to treat hypertension with non-pharmacological interventions such as warm compresses and menu planning. The second session occurred on May 12, 2017. Here, we delivered health education about the Pranayama breathing exercise and taught the family how to perform the exercise on their own. Pranayama breathing consists of full yogic breath (dhiirga swasam), respiratory breath (ujiyai), strong blowing breath (kapalabhatti), alternate nasal breath (anuloma viloma), and tooth breath (sitkari). Pranayama breathing was done 1–2 times a week for 25 minutes per session. In total, Mrs. S practiced Pranayama breathing 10 times, 6 times with the nurse, and 4 times independently.

Results and Discussion

As depicted in Figure 1, after 7 weeks of family nursing care, our patient’s systolic and diastolic blood pressure decreased. The systolic blood pressure of Mrs. S decreased from 200 mmHg at the beginning of the assessment to 170 mmHg at the end of the visit, while the diastolic blood pressure decreased from 120 mmHg at the beginning of the assessment to 90 mmHg at the end of the visit.

Decreased blood pressure after Pranayama breathing could be explained by several mechanisms. Firstly, the Pranayama exercises stimulate the vagus nerve, which in turn stimulates the parasympathetic nervous system, lowering heart rate and cardiac output and decreasing blood pressure. Activation of the vagus nerve can result from stimulation of the Nucleus Tractus solitarius (NTS), which also inhibits the vasomotor center and its sympathetic nervous system activities. Inhibition of the sympathetic nervous response decreases cardiac contractility and increases vasodilation, leading to reductions in blood pressure. Parasympathetic nerve stimulation resulting from Pranayama breathing exercises enhances respiratory sinus arrhythmia (RSA), which is the normal heart rate that increases when inhaling and decreases when exhaling. This creates a soothing effect that reduces stress and blood pressure, particularly during ujjayi breathing.

The another mechanism explaining the effects of Pranayama breathing on blood pressure is stimulation of pulmonary stretch receptors. As noted by Yadav, deep breathing during Pranayama exercise activates pulmonary stretch receptors according to the Hering-Breuer reflex. The activation of these receptors effectively “pulls” the sympathetic nervous effects of blood vessels in the muscle, resulting in vasodilation and decreased peripheral resistance. Blood pressure itself is a force generated by blood against peripheral resistance or the blood vessel wall, so decreases in peripheral resistance are directly proportional to decreases in blood pressure. Apart from these mechanisms, Pranayama breathing has other benefits, including reducing stress and lowering blood pressure. The basic philosophy of Pranayama breathing involves inhaling sufficient oxygen and removing sufficient carbon dioxide so that all parts of the body, including the brain, heart, and nerves, receive the energy needed to perform their functions, while toxins are removed from the body.

Conclusion

Pranayama breathing is an effective intervention to reduce blood pressure in adults with hypertension. This exercise stimulates the vagus nerve, the parasympathetic nervous system, and pulmonary stretch receptors. It reduces pulse rate and peripheral resistance so that blood pressure lowers. The Pranayama breathing exercise is recommended for use by nurses as an applied form of relaxation. It may be especially useful for managing hypertension in families and communities. It is effective, economical, and easy to perform. Our blood pressure measures did not consider others risk factors for hypertension, and this is a limitation of this study. Further research on the relationship between Pranayama breathing exercises and blood pressure in adults is needed. Future experimental studies should include large patient cohorts.

References


Figure 1. Blood Pressure Status of Mrs. S (in mmHg)


