Walking Exercise and Blood Pressure among Elderly With Hypertension In Nursing Homes

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Abstract

Background: The raised prevalence of people living with hypertension was becoming a global health problem as it’s reported each year. Furthermore, the raised of blood pressure can be caused by several factors, such as an unhealthy lifestyle and lack of physical exercise that consequently lead to chronic kidney disease, coronary heart disease, stroke, and even death. One of complementary therapy that can control blood pressure was walking exercise.

Objectives: This study aimed to determine the effect of walking exercise on blood pressure among the elderly with hypertension in a nursing home.

Method: The research applied Pre-experimental type of pre-test and post-test without a control group. There were totally 32 elderly selected by purposive sampling based on inclusion and exclusion criteria. The tools used were sphygmomanometer aneroid type and stethoscope. Walking exercise was given at 3 times a week with 30 minutes per session. Data analysis was used paired t-test.

Results: The results show that there was a significant effect of walking exercise to reduce blood pressure among the elderly with hypertension with a p value of 0.000 (p <0.05). Mean systolic 10,938, SD 4,655 and mean diastolic 6,563, SD 4,826.

Conclusion: There are differences in blood pressure before and after walking exercise. This intervention can be used as a complementary therapy. Walking exercise was easier and simpler since this physical activities can be performed independently and consequently should be integrated in non-communicable disease program in primary health care services.

Keywords: elderly, hypertension, nursing homes, walking exercise

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INTRODUCTION

Hypertension is a global and national public health threat. At present, some age groups are at risk of hypertension especially the older adults who are vulnerable to various health problems including hypertension. Countries need to develop programs and budgets for managing hypertension so that the impact can be minimized. Hypertension is a condition of increased systolic blood pressure of more than 140 mmHg and diastolic more than 90 mmHg in patients with diabetes mellitus and 130/90 mmHg in patients with non-diabetes mellitus [1]. Hypertension is a non-communicable disease (NCD) with and there were an incline of hypertension cases worldwide annually.
WHO reported that 1.13 billion (42%) of world population have hypertension. As many as 1 in 3 people in the world are diagnosed with hypertension however, only 36.8% consume hypertension medication. Hypertension mortality rate was estimated as many as 8 million cases each year, and 1.5 million of them come from countries in Southeast Asia (WHO, 2015). National data states that the largest proportion of all non-communicable diseases is hypertension with a number of cases of 57.87%. The data is supported by the results of blood pressure measurements and included in the category of hypertension at age> 18 years by 34.1%. The highest prevalence of hypertension cases was found in the elderly age group consisting of ages 55-64 years (45.9%), 65-74 years (57.6%), and> 75 years (63.8%) [2]. The largest proportion of NCDs in Central Java Province in 2018 was a hypertension reaching 1.38 million cases [3]. The prevalence of elderly with hypertension in Central Java Province was 58.84% (aged 55-64 year), 61.6% (aged 65-74 year), and 65.5% (aged > 75 year) [2]. Based on a preliminary study, there were 92 cases of elderly with hypertension in WeningWardoyoUngaran's Elderly Social Services House. The increase in the number of hypertension cases is caused by several factors.

The risk factors for hypertension are grouped into two categories namely modifiable and non-modifiable risk factors. Modifiable risk factors include obesity, diet, smoking habits, alcohol consumption, stress, lack of activity and physical exercise. While the risk factors that cannot be modified are heredity, gender, and age [4]. Therefore, disease prevention measures can be made through risk factor management. Hypertension needed to be handled properly to prevent future impacts or complications. Reportedly, hypertension causes heart disease and stroke with a 45% mortality rate in heart disease and 51% in stroke due to hypertension [5]. Cardiovascular mortality rate, especially due to coronary heart disease and stroke, is predicted to increase significantly reaching 23.3% of cases in 2030 [5]. Based on this, there is a need for specific effort to deal with hypertension comprehensively through preventive, promotive, curative, and rehabilitative measures.

Management of hypertension can be done through pharmacological and non-pharmacological therapy. Pharmacological therapy by taking anti-hypertensive drugs is the main intervention. But there is a need for supporting interventions by modifying lifestyles in order to meet the target of suggested blood pressure effectively and efficiently. Lifestyle modification can be done by limiting the consumption of salt that is 1/4 - 1/2 teaspoon (6 grams) per day, losing weight, reducing consumption of drinks or foods containing caffeine, cigarettes, alcohol, and adequate rest for 6-8 hours a day [2]. In addition, physical activity in the form of walking, jogging, cycling, swimming, and other that carried out within 20-25 minutes duration for 3-5 times a week is also suggested [5].

Some physical exercise can be easily carried out by various age groups, including the elderly. The elderly are encouraged to do simple sports such as walking exercise. This can boost blood circulation and push blood flow, body fitness, and promote the heart to pump optimally [6]. Walking exercise can slow down the degeneration process of aging and facilitate the adjustment of physical health, especially cardiovascular health [6]. Effective physical exercise can increase life expectancy and health status in the elderly. This is in line with the results of research by [7,8] which stated that elderly with hypertension who carried out walking exercise every day for 3 weeks for 35-45 minutes per day shows controlled blood pressure.

Walking exercise has been found to have a beneficial effect on blood circulation. Walking exercise is a modified form of non-pharmacological therapy that is easy and inexpensive alternative. The development of models or non-pharmacological interventions has implications for the nursing science outgrowth as an independent nursing action that can be undertaken to the community. The act of independent nursing intervention can enhance the nurse's role in providing comprehensive nursing care. These innovative interventions can be integrated with NCDs control programs in health care facilities such as PROLANIS (Indonesia Program of NCD Management).
This study aimed to identify the effect of walking exercise on reducing blood pressure in the elderly with hypertension at the Wening Wardoyo Ungaran Senior Social Services Home.

METHODS

Our study was a Pre-experimental type of pre-test and post-test without a control group. The study population is all elderly with hypertension as many as 51 elderly. This research was conducted in February 2020 at Wening Wardoyo Ungaran Elderly Social Service House. There were totally 32 elderly selected by purposive sampling based on inclusion criteria of older adults aged 60-74 year, diagnosed with hypertension, had blood pressure of 140/80 mmHg-159/99 mmHg, had no physical mobility drawback, and lastly were able to move independently. The independent variable is walking exercise and the dependent variable is blood pressure. (Triyanto & Endang, 2014). Walking exercise was given 3 times a week with 30 minutes per session. The researcher gave the explanation about the study procedures and informed consent as the preparation. The elderly blood pressure was measured before intervention (beginning of week 1) and after intervention (the end of week 3). The blood pressure, as measured after the intervention was taken 15 minutes after resting.

Two enumerators that fit the requirement criteria of this study were involved and were specifically given the essential steps of the study. The blood pressure was measured using the aneroid type sphygmomanometer, stethoscope with dual head chest type specifications and ear type plugs, and reported in blood pressure observation sheets. Data analysis consisted of univariate and bivariate data analysis. Categorical data variables (sex) are presented in frequency and percentage. Numeric data variables (age and blood pressure) are presented in the mean and standard deviation. The data is normally distributed with result skewness value of -0.691 to 0.849 (range -2 to +2). Bivariate analysis data was using the paired t-test. This study passed the ethical test from the Medical/Health Research Bioethics Commission, Faculty of Medicine, Sultan Agung Islamic University, Semarang with the approval number of No.032/I/2020/Bioethics Commission on January 31, 2020.

RESULTS

The characteristics of the elderly with hypertension are presented in the following table:

<table>
<thead>
<tr>
<th>Characteristics of Age (n = 32)</th>
<th>Mean</th>
<th>SD</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>71.66</td>
<td>3.807</td>
<td>70.28 - 73.03</td>
</tr>
</tbody>
</table>

Based on table 4.1, the average age of the elderly with hypertension is 71.66 years with SD 3.807.

<table>
<thead>
<tr>
<th>Characteristics of Gender (n = 32)</th>
<th>f</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>10</td>
<td>31.3</td>
</tr>
<tr>
<td>Female</td>
<td>22</td>
<td>68.8</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.2 Characteristics of the elderly with hypertension by sex (n = 32)
Based on table 4.2, half portion of the elderly with hypertension is female (68.8%).

<table>
<thead>
<tr>
<th>blood pressure</th>
<th>Mean</th>
<th>SD</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systole</td>
<td>143.13</td>
<td>4.709</td>
<td>141.43 to 144.82</td>
</tr>
<tr>
<td>diastole</td>
<td>83.13</td>
<td>4.709</td>
<td>81.43 to 84.82</td>
</tr>
</tbody>
</table>

**Table 4.3** systole and diastole blood pressure in the elderly with hypertension before walking exercise (n = 32)

Based on table 4.3, the mean systolic blood pressure in the elderly with hypertension before walking exercise is 143.13 mmHg with SD 4,709. Furthermore, the mean diastolic blood pressure in the elderly with hypertension before walking exercise is 83.13 mmHg with SD 4,709.

<table>
<thead>
<tr>
<th>Blood pressure</th>
<th>Mean</th>
<th>SD</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systole</td>
<td>132.19</td>
<td>5,527</td>
<td>130.19 - 74.82</td>
</tr>
<tr>
<td>diastole</td>
<td>76.25</td>
<td>4,826</td>
<td>134.18 - 78.30</td>
</tr>
</tbody>
</table>

**Table 4.4** Blood pressure systole and diastole in the elderly with hypertension after walking exercise (n = 32)

Based on table 4.4, the mean systolic blood pressure in elderly hypertensive after walking exercise is 132.19 mmHg with SD 5,527. The mean diastolic blood pressure in the elderly with hypertension after walking exercise is 76.25 mmHg with SD 4,826.

<table>
<thead>
<tr>
<th>Mean blood pressure</th>
<th>difference</th>
<th>SD</th>
<th>value of</th>
</tr>
</thead>
<tbody>
<tr>
<td>pretest posttest systole</td>
<td>10.938</td>
<td>4,655</td>
<td>0.000</td>
</tr>
<tr>
<td>pretest posttest diastole</td>
<td>6.563</td>
<td>4,826</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table 4.5 shows that there are significant difference of systolic blood pressure in the elderly with hypertension before and after walking exercise with a value of p = 0.000 (p <0.05), a mean difference of 10.938 and SD 4,655. There was a significant difference in diastolic blood pressure in the elderly with hypertension before and after walking exercise with a value of p = 0.000 (p <0.05), a mean difference of 6,563 and SD 4,826.

**DISCUSSION**

The average age of the elderly with hypertension is 71.66 years. Older adult is one of the vulnerable groups that has greater risk of experiencing health problems including hypertension. Moreover, hypertension is also a degenerative disease related to age which progressively impaired the regulation of calcium metabolism. This accumulation of calcium that circulates in the bloodstream caused the blood becomes thicker and leads to the increase in blood pressure [9]. As the aged progressed and the aging process, there is a physiological decrease that diminishes elasticity of the arteries that eventually leads to inability of the heart to pump blood to the fullest. The inability of the heart to work optimally has an impact on increasing blood pressure. This physiological function decline in the elderly makes the elderly at high risk of hypertension [9]. Furthermore, increased blood pressure occurs due to thickening of the arterial wall which results in the accumulation of collagen in the muscle layer [10]. This causes the blood vessels to narrow and become stiff. This is in line with research conducted by [10] which stated that with increasing age, the higher the risk of hypertension. Another characteristic associated
with hypertension is sex. The majority of elderly with hypertension are women. This is caused by the role of the hormone estrogen in increasing levels of High Density Lipoprotein (HDL) which affects the process of atherosclerosis in women of childbearing age [6].

The mean systole and diastole blood pressure in the elderly with hypertension before walking exercise was 143.13 mmHg and 83.13 mmHg respectively. [10] also explained that the mean systolic blood pressure in the elderly with hypertension before intervention was 146.23 mmHg and diastole was 90.00 mmHg. This is in line with the research [6] that found a mean systole blood pressure in the elderly with hypertension before walking exercises of 140-159 mmHg and diastole of more than 100 mmHg. Other similar studies mention the mean systolic blood pressure in the elderly with hypertension before walking exercise and low-impact exercises of 147.33 mmHg and diastole of 92.67 mmHg [11]. Our study complements these various studies that denote the average blood pressure of both systole and diastole in elderly with hypertension before walking exercise is more than 140 mmHg so that it is included in the category of hypertension.

Furthermore, the mean systole and diastole of blood pressure in the elderly with hypertension after walking exercise showed a decrease of 10.94 mmHg and of 6.57 mmHg respectively. The results of this study were supported by [10] who explained that the blood pressure of systole and diastole in the elderly with hypertension showed a decrease after walking exercise. A similar study conducted by [7] that explained that after walking exercise, systolic and diastolic blood pressure in the elderly with hypertension tends to be stable. Blood pressure in elderly with hypertension is in the normal blood pressure range or decreases to 0-5 mmHg compared to elderly with hypertension who do not carried out walking exercise. This walking exercise involved the leg movements and arm swings so that promote active muscle movement during walking exercise. Active muscle movements require a fair amount of nutrients in order to work optimally and were supported by the heart muscle work and good blood vessels [6]. Based on this, it can be concluded that there was a declining number of both systole and diastole after the walking exercise program.

There was a significant difference in systolic and diastolic blood pressure in the elderly with hypertension before and after walking exercise. This is in line with research conducted by [12], that showed a significant difference in the average systole and diastole blood pressure of the elderly with stage 1 hypertension before and after walking exercise with a value of p = 0.000 (p <0.05). Another similar study stated that there was a decrease in systole and diastolic blood pressure in the elderly with hypertension before and after walking exercise with a value of p = 0.000 (p <0.05) [7]. [6,13] stated that there is an effect of walking exercise on changing the blood pressure in elderly with hypertension with a value of p = 0.000 (p <0.05). the difference between this study and previous research is the characteristics of the age range of older adult (60-74 years old) and the location of the study is carried out in a nursing home setting.

A decrease in blood pressure can occur because of walking exercise stimulates blood flow into the blood vessels of the heart which ensures oxygen demand in the heart muscle is met. The heart muscle that gets adequate oxygen will be able to pump the blood throughout the entire body [10]. The aging process in the elderly, then there is a physiological deterioration that causes the large arteries to lose their elasticity and become stiff, unable to expand when the heart pumps blood through these arteries [9]. Therefore, the blood in each heart beat is forced through the narrower blood vessels than usual, causing an increase in blood pressure. This is what happens to the elderly so that the elderly have a greater risk of developing hypertension. Regular physical activity can help maintain blood vessel’s elasticity. In addition, regular physical activity teaches the body to properly train muscles when walking. Thus reducing the heart workload. These changes function to reduce heart rate and blood pressure during exercise. The heart muscle needs oxygen related to heart rate and blood pressure [10].
Regular physical activity or exercise can minimize problems due to changes in bodily functions and play an important role in lowering blood pressure. Several previous studies have explained that physical activity or exercise can reduce 5-10 mmHg in both systolic blood pressure and diastole [10]. Physiologically wise, blood pressure in people who perform walking exercise will increase, however it will gradually lower to the normal range immediately after the physical activity and lasts for 30-120 minutes. The decrease that occurs is due to vasodilation [7].

Walking exercise is one of the non-pharmacological complementary therapies that can improve and maintain the heart muscle work. Walking exercise that is implemented regularly can improve health status assuredly [6]. This implementation of walking exercise proven to be an effective non-pharmacological therapy as a form of independent nursing action that increase the capacity of nurses in providing nursing care. Nurses as the forefront of health workers must strive to provide innovative approach through modification of nursing interventions in accordance with community needs and relatable nursing evidence. Nurses needs to collaborate with cross-sectors in implementing interventions so that they are able to achieve the specified outcomes and continuously sustainable. The limitation of this study is that blood pressure measurements were not carried out every session of week. So that this can be a consideration for further research. Blood pressure monitoring per session or week can reflect changes in blood pressure in the elderly before and after physical activity.

CONCLUSION

Hypertension is a chronic NCD that can have a negative impact on older adults’ activities of daily life and eventually leads to diminished quality of life if not addressed properly. Based on the results of the study, it was found that walking exercise as a form of complementary nursing therapy can reduce systolic and diastolic blood pressure in the elderly with hypertension. Walking exercise is a simple, easy, inexpensive intervention in accordance with the characteristics of the elderly, and is effective in lowering blood pressure. This intervention can be integrated with non-communicable disease control programs in primary health care facilities such as PROLANIS or Posbindu PTM (Indonesia Comprehensive Assistance Post of NCD). Future research can further investigate the effect of walking exercise on other variables such as heart rate, respiratory rate, and so on as needed.

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REFERENCES


