
The Effect of Dietary Changes in Controlling the Hypertension in Sleman Yogyakarta

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Abstract

Background: Hypertension is the disease with the highest number of cases among patients who visit primary care. Most hypertension is caused by a poor diet. One of the main causes of hypertension is poor food control. This study aimed to know the effect of diet control education intervention against the behavior changes in controlling the blood pressure for hypertensive patients. **Methods:** This study used the quasi-experimental design with pre-test and post-test with a control group. The intervention and control groups were chosen through the implemented criteria of inclusion and exclusion. The used sampling technique was a simple random sampling. There were 84 subjects of hypertensive patients. The subjects were divided into two groups, i.e., 42 patients (intervention group) and 42 patients (control group). The intervention was done for six weeks. **Result:** There were differences in dietary control behavior changes between the control and intervention groups. The intervention group had significant ($p < 0,05$) change, 1.41 while control group had decreased in score (Δ) (0.47) where the value of p was not significant, ($p > 0.05$). The average value of systolic blood pressure for the intervention group was 4.47 mmHg/5.17 mmHg, and the increase of the average value of systolic blood pressure was 3.63 mmHg/5.95 mmHg for the control group. **Conclusion:** Dietary control education influences blood pressure control for hypertensive patients.

Keywords: Dietary control, Education, Hypertension, Lifestyle changes

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1. Introduction

World health organization (WHO) in 2002, reported that the global prevalence of hypertension was approximately 972 million people (26.4%) of the total world population. In the developed country, there were a total of 333 million people, and in the developing country, there were 639 million people, including Indonesia. This prevalence is predicted to continue to increase to 29.2% in 2030.⁽¹⁾ Hypertension is one of the chronic diseases which is the leading cause of death. Most of the complications that cause these deaths are cardiovascular. Nine million people die each year due to these complications.⁽²⁾

Management of hypertension based on clinical practice guideline is divided into two, namely pharmacology and non-pharmacology. The pharmacological management consists of medicine distribution which is diuretic, sympathetic, beta blockers and vasodilators. At the same time, non-pharmacological treatment focuses on the control of dietary by using dietary approach to stop hypertension (DASH) and routine exercise. Dietary control is one component of lifestyle change that has a role in controlling the blood pressure.⁽³⁾ Dietary control is recommended for controlling weight.⁽⁴⁾

2. Method

This study used the quasi-experimental design with pre-test and post-test with the control group. The intervention group was the group that received an intervention while the control group was the group that did not receive any intervention. The samples were chosen through specified inclusion and exclusion criteria. The technique of the sample selection was simple random sampling technique. Both groups answered the questionnaire from the researcher. Then, the intervention group would obey and follow the dietary control program which consisted of group counseling with a frequency of once for six weeks for a duration of 30-45 minutes, filling the independent control cards, watching video playback about dietary control and hypertension for 3-5 minutes, and a personal education with a frequency of twice a week for six weeks.

The independent control card was filled in by the respondent if there were complaints outside the researchers' follow-up time. After six weeks, the researcher conducted the assessment based on the patient answers to the questionnaire and the result of the blood pressure test. The used instruments were the questionnaire for measuring patient behavior that had been validated, blood pressure measurements using a sphygmomanometer that had been previously calibrated and the guidelines for dietary control activities.

3. Results and Discussion

3.1 Results

The research was carried out in Sleman Regency for six weeks from September to November of 2017. This study used 84 samples that were divided into two groups, i.e., 42 samples in the intervention group and 42 samples in the control group. The researcher conducted the preliminary assessment to understand whether the condition of both groups had similarities or differences after receiving the dietary control intervention.

The result of the preliminary research showed that the preliminary data comparison test (baseline) between the control and intervention group showed no significant differences ($p > 0.05$). All detail analysis is shown in Table 1.

Table 1. The Characteristics of Preliminary Data of Respondents before Receiving the Intervention

No	Pre-Data	Control	95%CI	Intervention	95%CI	p-value
1	Average Score of Diet Behavior	6.30±0.89	6.03-6.58	6.59± 1.16	6.23-6.95	0,191
2	Average Score of Systolic Blood Pressure	154.23±9.07	1.51-1.57	152.95±8.82	1.50-1.55	0,435
3	Average Score of Diastolic Blood Pressure	89.28±8.37	86.67-91	92.14±5.64	90.38-93.9	0,068

The result of research after implementing the intervention for six weeks and carrying out the blood pressure test for three times a week showed that the average score of systolic blood pressure after the intervention in the control group increased from 89.28 to 157.86 ($p = 0.000$). The result indicated that there was a significant difference in systolic blood pressure average score. At the same time, for the intervention group, the average systolic blood pressure decreased from 152.95 to 148.48 ($p = 0.001$). It means that there was a significant difference in the systolic blood pressure average score in the intervention group.

Meanwhile, the diastolic blood pressure in the control group increased from 89.28 to 95.23 ($p = 0.000$). Thus, there was a significant difference in the diastolic blood pressure mean score. Also, for the intervention group, the average score of diastolic blood pressure decreased from 92.14 to 86.97 ($p = 0.000$). It means, there was a significant difference in the average score of diastolic blood pressure.

Table 2. The Characteristics of Respondent Data after Intervention

Post Data	Mean±SD (95% CI)				P-value			Δ	
	Control Group		Intervention Group		p ₁	p ₂	p ₃	Δ ₁	Δ ₂
	Mean	CI	Mean	CI					
Average Score of Diet Behavior	5.83±0,62	5.63-6.02	8.00±0.62	7.80-8.19	0.414	0.00	0.000	0.47	1.41
Average Score of Systolic Blood Pressure	157.86±7.58	1.55-1.60	148.48±6.48	1.46-1.50	0.000	0.001	0.000	3.63	4.47
Average Score of Diastolic Blood Pressure	95.23±4.93	93.70-	86.97±4.94	5.03-88.51	0.000	0.000	0.000	5.95	5.17
		96.77							

3.2. Discussion

Hypertension is one of chronic diseases that becomes global health problems in both developed and developing countries. This disease has the biggest risk factor for cardiovascular death, which is more than 40% of the population over the age of 25 years and is estimated to cause as many as millions of deaths every year.⁽²⁾ According to the WHO in 2012, the global prevalence of hypertension was 972 million (26.4%) of the total population which was divided into two in developed countries with approximately 333 million and in developing countries with approximately 639 million, including Indonesia. This number was predicted to continue to increase to 29.2% in 2030.⁽¹⁾

The management of hypertension is divided into two, pharmacology and non-pharmacology. The pharmacology management consists of medicine distribution including diuretic, sympathetic, beta blocker and vasodilator. Non-pharmacological treatments include weight loss or normal weight maintenance, regular exercise, low salt & fat diets, DASH and smoking cessation.⁽⁵⁾ The change of lifestyle is a part of the hypertension management that can be utilized for decreasing the blood pressure, increasing the effectiveness of antihypertensive drugs, and decreasing the risk of cardiovascular. The modification of dietary control is one of the components of lifestyle changes that has the most significant role in reducing blood pressure.⁽³⁾

The recommendation of The Seventh of the joint national committee on detection, evaluation, and treatment of high blood pressure (JNC-VII) is about limiting the consumption of salt, with no more than 2.4 grams of sodium or about one teaspoon of salt. The research conducted by Soltani showed that the comparison of lifestyle recommendations, socialization, DASH counselling and also salt restriction <2400 gr a day decreased the blood pressure for approximately. 32%. It is higher than the group that applies ELRonly.⁽⁶⁾ Sodium is the primary component that contributes to the changes in the extracellular fluid. The increase in sodium in the blood will cause an increase in sodium reabsorption. It is because there is an increase in the osmotic pressure of the interstitial fluid and a decrease in the hydrostatic pressure of the interstitial fluid. This mechanism causes increased total peripheral resistance and cardiac output. As a consequence, the blood pressure increases. The mechanism of the association of increasing sodium consumption results in significant systolic blood pressure as has been proved by Takase (2015) who investigated that an increase in the amount of sodium in urine that was accommodated in 24 hours was associated with the increased blood pressure in Japan population.⁽⁷⁾

This treatment concept is the derivative of the social comparison theory (SCT), theory that focuses on the final purpose of the patients.⁽⁸⁾ The model of self-care treatment describes

that when the patients were taking self-care actions, it was influenced by internal and external factors. The patient's knowledge, attitudes, feelings, and beliefs are internal factors that greatly influence self-care. In addition to internal factors, external factors which consist of role models, technical advice and service, social support, cost sources, and health facility systems also play an important role in the success of self-care.⁽⁸⁾ Health belief model (HBM) is one of the most important theories of behavioral change that has been widely considered in behavioral health sciences and successfully applied in the design of health interventions.⁽⁹⁾ Three main factors that support the theory of HBM are the factor of modification (knowledge), the factor of sociodemographic (which can affect the perception of health), and the factor of health beliefs.⁽¹⁰⁾ The Health Belief Model trusts a patient who feels susceptible to hypertension and its complication.⁽¹¹⁾

Hypertension is the main risk factor for cardiovascular diseases and stroke. However, it is not taken seriously and is often deficiently controlled.⁽¹²⁾ A survey of the risk factors of non-communicable diseases in Iran revealed that 25.2% and 45.5% of the adults between 25 and 64 years old had hypertension and prehypertension, respectively. However, 66% of the hypertensive patients were unaware of their disorder, 75% were untreated, and 94% were not controlled. These proportions are relatively high compared to those reported in other countries.⁽¹³⁾ Patients' knowledge about Hypertension and benefits of lifestyle modifications seems to be the key to successful control of hypertension.^{(5),(14)} However, lifestyle changes are not easily achieved. Adherence to treatment increases when the patients are active ⁽¹⁵⁾. Therefore, well-designed educational interventions with active participation of the patients are necessary for increasing hypertension knowledge, self-monitoring, and control.⁽¹⁶⁾

The management of DASH is suggested by JNC-VII for hypertension management. Principally, this dietary control lets the patients consume fruits, vegetables, low-fat milk, and nuts. This dietary contains potassium level. Thus, patients with decreased kidney function need to reconsider the implementation of this dietary. Sodium recommendation is <2.4 g (100 mEq) / day.⁽¹⁷⁾ Obese hypertensive patients have a characteristic of increased cardiac output, stroke and intravascular volume, which have a close correlation with fat-free body mass compared to adipose mass. Increasing the amount of adipose in obese patients will increase the production of substances that will cause insulin resistance. Obesity is also commonly known to have a relation with the circulating hyperleptinemia. Leptin will directly decrease arterial distensibility that affects tone and the growth of blood vessel, and stimulates proliferation of smooth vascular muscle cells. All of these will increase blood pressure (hypertension).⁽¹⁸⁾ Body mass index (BMI) is used to assess the proportionality of the ratio between one's height and weight. BMI is used to measure ideal weight and is a good measurement method to assess the risk of diseases that can occur due to excessive body weight including hypertension.⁽¹⁹⁾ Hypertension patient is recommended to have BMI in the range of 18.5–24.9. The patients who have normal BMI criteria are suggested to maintain it and the patients who have over BMI criteria are recommended to decrease it. A decrease in BMI in this range will reduce blood pressure by approximately 5-20 mmHg or 10 kg of weight loss.⁽²⁰⁾

United states department of agriculture (USDA) issued graphic on a food guide called "My Pyramid" to motivate patients in consuming healthy food. The graphic is equipped with the interactive online system that can propose a suggestion about dietary and specific diet and physical activity that is tailored to the needs of each user. My Pyramid tends to improve diet and carry out physical activities independently. The Food Guide Pyramid categorizes five groups of food, cereals/oats, vegetables, fruit, milk products, and protein-rich foods. Cereals/wheat is at the bottom of the pyramid to indicate the largest portion of food. Fat, oil, and sugar are at the top of the pyramid to suggest that these foods must be consumed carefully. Everyone consumes at least 1600 kcal per day and at most 2800 kcal per day.⁽²¹⁾

In addition to My Pyramid method, patients can choose a more practical method of eating control, namely "My Plate." This method is an application in the form of an internet-based graph that can be applied using a computer. The aim of My Plate method is as a reminder to choose healthy foods, emphasizing the intake of vegetables and fruits. My Plate provides different meal plans and sample menus. These differences are made because the differences in age, gender, height, weight, and physical activity are considered. For example, a 40-year-old woman, who is 66 inches tall, and weighs 135 pounds who does 30-60 minutes of moderate physical activity in a day, is estimated to need 2200 kcal per day.⁽²¹⁾

In the end of research, after the implementation of diet control package approach, which included class counseling with a frequency of 1x / 6 weeks for six weeks with a duration of 30-45 minutes, self-control card, dietary control and hypertension video with a duration of 3-5 minutes, personal education with flip-flops 2x / week for 6 weeks, it could be seen that there was a difference in dietary behavior change in the control and intervention group. From the change of dietary behavior level (Δ) score between control and intervention group, it is known that there was a significant difference ($p < 0,05$) in intervention group which was marked by the increase of the dietary behavior level (Δ) score in the intervention group (1.41). Meanwhile, in the control group, there was decreased dietary behavior level (Δ) score in the control group (0.47) with a non-significant difference with p-value ($p > 0.05$).

Lifestyle modification (LSM) is the recommendation made by Joint National Committee VIII for hypertensive sufferers. In the JNC VIII guideline, LSM that is recommended is DASH, weight loss or healthy weight maintenance, reduced sodium intake, physical activity, alcohol restrictions and smoking cessation.⁽²²⁾ The result of this research is supported by the prior study which concluded that there was an increase in dietary behavior level, physical activities and a decrease in the value of total cholesterol, triglycerides, HbA1c and fasting glucose after lifestyle modification program (LPM). LSM contains the activity program of education and counselling for patients for 1-4 months.⁽²³⁾ The researcher also argues that the increase of the intensity of the dietary control behavior in patients is closely related to the strong motivation of the patient to recover from his illness. This can be proven by the increased dietary control for hypertensive patients.⁽²⁴⁾ Motivation is a primary factor that can promote and trigger the rise of spirit and also change individual behavior to be better.⁽²⁵⁾

Patients in the control group also implemented the behavior change. However, it was not as much as that found in the intervention group. Moreover, it can be seen that there was a decrease in score on the level of dietary behavior in the control group. This was caused by the fact that the patients in the control group did not receive the information about the benefits of dietary control on blood pressure control as well as the counselling from doctors and nutritionists. The change of behaviors that occurred in patients of the control group was caused by the pressure to obey the order of the doctor, or the influence patients got from other media that could not be controlled by researchers. It can be seen that the approach of dietary control has a significant effect against the change of dietary control behaviors.

The therapy prescribed by most clinicians will control hypertension only if the patient is motivated. Motivation takes place when the family as a social network around patients with hypertension encourages personal attitudes positively associated with health, such as sharing of information, helping in moments of crisis, and taking care of health in general. The patients who have a standard level of expertise on hypertension will be motivated to obey the guideline of dietary control.⁽²⁶⁾ The research result by Thompson (2014) showed a relationship between someone's knowledge and their attitude towards the treatment they were undergoing. The knowledge will form someone's framework of thinking that relates to the self-management undertaken. This fact shows the importance of knowing that illness affects the success of medication.⁽²⁷⁾

The researcher carried out the pre-test before the intervention in order to prevent coincidence bias. The result of the test before the intervention for both groups showed no significant difference in systolic and diastolic blood pressure ($p > 0,05$). At the end of the research, after implementing the intervention, the mean score differences in systolic and diastolic blood pressure were documented. This evidence is supported by some other studies which mentioned that the intervention of Lifestyle Modification Programme (LMP) that contains counselling, education, brainstorming about hypertension and LMP in seven weeks decreased the systolic and diastolic blood pressure and increased the knowledge on hypertension with a significant p ($p < 0.005$). A study of 27 RCTs noted that increasing physical activity three times a week for 30 minutes reduced systolic blood pressure and also facilitated weight loss.⁽²⁸⁾

DASH consists of the consumption of food ingredients that are clinically proven to significantly reduce blood pressure with or without a reduction in sodium intake.⁽²⁹⁾ Food items contained in the DASH are cereals and whole grains as many as 7-8 exchanges per day, vegetables as much as 4-5 exchanges per day, fruits with 4-5 exchanges per day, low or no fat dairy products with 2-3 exchanges per day, fish, meat and poultry with no more than 2 exchanges per day, 4-5 exchanges of nuts per week, 2-3 exchanges of oil a day and 5 exchanges of sweeteners per week.

Diet that emphasizes fruits, vegetables, and low-fat dairy products and includes whole grains, poultry, fish, and nuts, and reduced consumption of fat, red meats, sweets, and sugar-containing beverages leads to significant hypertension control in a person with Stage 1 hypertension.⁽³⁰⁾ DASH implementation consists of consuming low sodium, high potassium, magnesium, calcium, fiber, and also low saturated fatty acids and cholesterol which is clinically proven to significantly reduce blood pressure with or without a reduction in sodium intake. Moreover, DASH can reduce systolic blood pressure of 8 mmHg and a diastolic blood pressure of 3 mmHg in two weeks.⁽³¹⁾

4. Conclusion

Based on the results of the study, it is concluded that there are effects of dietary control interventions to change behavior in controlling blood pressure in hypertensive patient

5. References

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