The Effectiveness of Chronic Disease Management Program in Blood Pressure Control among Hypertensive Patients

Frieska Dyanneza[1,2], Didik Tamtomo[3], Sugiarto[4]

[1]Sebelas Maret University Hospital, Surakarta
[2]Masters Program in Public Health, Universitas Sebelas Maret
[3]Faculty of Medicine, Universitas Sebelas Maret
[4]Department of Internal Medicine, Dr. Moewardi Hospital, Surakarta

ABSTRACT

Background: The prevention and management of hypertension are major public health challenges for Indonesia and the rest of the world. If the rise in blood pressure with age could be prevented or diminished, much of hypertension, cardiovascular and renal disease, and stroke might be prevented. In Indonesia, the Social Security Administration Agency (BPJS) has administered a government program to control chronic diseases, including hypertension, namely *Prolanis* (chronic disease management program). This study aimed to determine the effectiveness of chronic disease management program in controlling systolic blood pressure in hypertensive patients.

Subjects and Method: This was an analytic observational study with case control design. The study was conducted at Pratama Griya Husada Clinic 2 Tasikmadu, Karanganyar, Central Java, in April 2017. A sample of 120 hypertensive patients, consisting of 60 controlled hypertensive patients and 60 uncontrolled hypertension patients, were selected for this study using fixed disease sampling. The dependent variable was systolic blood pressure. The independent variable was chronic disease management program for systolic blood pressure control, consisting of health status monitoring, reminder, club activity, home visit, dietary education, and physical activity education. Data on diet were collected by Food Frequency Questionnaire (FFQ) based on the DASH eating plan. Physical activity data were collected by short-form International Physical Activity Questionnaire (IPAQ). The other data were collected using questionnaires. Multiple linear regression was used to analyze the data.

Results: Blood pressure of hypertensive patients was reduced by chronic disease management program, including monitoring health status (b= -6.34; 95% CI= -12.42 to -0.26; p= 0.041), reminder (b= -6.22; 95% CI = -13.30 to -0.87; p= 0.085), club activity (b= -3.46; 95% CI= -6.40 to -0.53; p= 0.021), home visit (b= -22.01; 95% CI= -41.85 to -2.17; p= 0.030), dietary education (b= -3.61; 95% CI= -6.66 to -0.57; p = 0.020), and physical activity education (b= -0.40; 95% CI= -0.79 to -0.01; p= 0.001).

Conclusion: Chronic disease management program is effective to control blood pressure of hypertensive patients. The program's components including monitoring health status, reminder, club activity, home visit, dietary education, and physical activity education, are effective in reducing blood pressure in hypertensive patients.

Keywords: hypertension, chronic disease management program

Correspondence:
Frieska Dyanneza. Masters Program in Public Health, Universitas Sebelas Maret, Jl. Ir. Sutami 36 A, Surakarta, Central Java. Email: frieskadyanneza@yahoo.co.id. Mobile: +6285741667850.

BACKGROUND

Non-communicable disease is a chronic disease that cannot be spread from one person to another (Nur and Warganegara, 2016; Riskesdas, 2013). The non-communicable disease becomes the main factor for 63.00% global mortality based on the global status report on non-communicable

disease (Pusat Data dan Informasi Kementerian Kesehatan RI, 2012; Martiyana and Handayani, 2015).

WHO estimates that mortality due to the non-communicable disease will keep increasing throughout the world. By 2030, it is globally, regionally, and nationally estimated that there will be a transition of epidemiology from the communicable disease to the non-communicable disease and it is also estimated that the proportion of mortality rate will be 69.00% and the mortality rate itself will be 52 million people per year due to the non-communicable disease (Dinkes Jateng, 2014; Pusat Data dan Informasi Kesehatan RI, 2012).

The increasing rate of non-communicable disease has negative impact toward economy and productiveness. The non-communicable impact has negative impact toward salary, participation and productiveness of labours, and working hours and also has negative contribution toward early retirement and defection including the permanent defection. The medication of non-communicable disease demands long period and enormous fund; as a result, such medication disturbs the economy of both the patient and his or her family (Dinkes Jateng, 2014; Kreinsen et al., 2009).

The increase of non-communicable disease is related to the increase of risk factors due to the change of an individual's life style along with the development of the modern world, the population growth, and the increasing age of life expectation (Pusat Data dan Informasi Kementerian Kesehatan RI, 2012).

Hypertension is one of the non-communicable diseases. Hypertension becomes the main problem of public health in the world, including Indonesia, and becomes the third greatest cause of early mortality due to the ever-increasing preva-

lence. The prevalence of hypertension is estimated to be around one billion individuals or one of four adult individuals suffer from hypertension and hypertension itself becomes the cause of mortality for 7.1 million people per year or 13% of the total mortality throughout the world (Korneliani and Meida, 2012; Setiawan et al., 2013; Venkataraman et al., 2013).

Based on the data from WHO, there were around 600 million patients of hypertension all around the world in 2004 (Arifin et al., 2016). Then, there were 25.80% of hypertension patients in Indonesia in 2013. Hypertension still occupies the biggest proportion of disease in the Province of Central Java which is 57.89%; as a consequence, this disease becomes the top priority of non-communicable disease control (Dinkes Jateng, 2014).

The number of hypertension patients in Karanganyar District is 12,329 people (Dinkes Karanganyar, 2014). This number is estimated to increase about 60.00% by 2025 (Diaz and Shimbo, 2013; Rustiani et al., 2014).

Around 13% of mortality due to hypertension is related to the cardiovascular disease, while 62 % is related to the stroke (Geaney et al., 2015). The decreasing blood pressure influences the mortality rate due to the heart disease and the stroke. 5 mmHg decrease on the diastolic blood pressure for five years consecutively is related to the decrease of stroke around 34% and to the decrease of coronary heart disease around 21%. On the other hand, 7.5 mmHg decrease on the diastolic blood pressure for five consecutive years is related to the decrease of stroke around 46% and to the decrease of coronary heart disease around 29%. Furthermore, 10 mmHg decrease on the diastolic blood pressure is related to the decrease of stroke around 56.00% and to the decrease of

coronary heart disease around 37% (Kokkinos et al., 2009).

The principle in medicating hypertension is preventing is better than medicating (Dinkes Jateng, 2014). The suggested first treatment for hypertension is changing the life style (Rustiani et al., 2014). The breakdown of hypertension starts prior to the diagnosis enforcement; however, through early detection and medication the impacts of hypertension can be decreased (Urgoji, 2014).

The government program in managing the chronic disease is known as *Prolanis* (*Program Pengelolaan Penyakit Kronis* or Chronic Disease Management Program). This program refers to the implementation of integrated health service system and proactive approach that involves participants, health facilities, and BPJS Kesehatan (Social Security Administration Agency). The aim of this program is to maintain the health of the participants who suffer from chronic disease in order that they achieve optimum life quality under effective and efficient cost of health service (Lumempouw et al., 2016). The activities of *Prolanis* consist of education, health status monitoring, club activities, reminder, and home visit (BPJS Kesehatan, 2014).

Based on the above background, this study therefore aims at analysing the influence of the Chronic Disease Management Program toward the systolic blood pressure of hypertension patients.

SUBJECT AND METHOD

1. Study design
This was an analytic observational study with case control design. The study was conducted at Pratama Griya Husada Clinic 2 Tasikmadu, Karanganyar, on April 2017.

2. Population and Sample
The population in this study was the hypertension patients in Pratama Griya Husada Clinic 2 Tasikmadu, Karanganyar. A sample of 120 hypertension patients was selected using fixed disease sampling.

3. Study variables
There were six variables in this study and these variables were divided into the independent variables and the dependent variable. The independent variables were health status monitoring, reminder, club activity, home visit, education on the eating pattern, and education on the physical activity. On the other hand, the dependent variable was the systolic blood pressure of the hypertension patients.

4. Operational Definition of the Variables
Health status monitoring was defined as a routine monitoring toward the blood pressure in the health facility within the last three months. Reminder was defined as the activity of motivating the hypertension patients to perform routine visit to the health facility through the short message service that reminded the patients about the schedule of their visit. Club activity was defined as the gymnastic activity that had been performed in the health facility.

Furthermore, home visit was defined as the visitation toward the home of the hypertension patients for delivering health information. Education on the eating pattern was defined as the activity to improve the knowledge on the eating pattern using the behavioral results. Education on the physical activity was defined as the activity to improve the knowledge on the physical activity using the behavioral results. Last but not the least, the systolic blood pressure of the hypertension patients was defined as the systolic blood pressure that had been measured within the hypertension patients.

5. Study Instrument
The systolic blood pressure of the hypertension patients was measured by using

sygmamometer and stethoscope. The primary data that had been related to the health status monitoring, reminder, club activity, and home visit were gathered using a questionnaire.

Food Frequency Questionnaire (FFQ) based on DASH Eating Plan was distributed in order to gather the primary data that were related to the education on the eating pattern. Then, International Physical Activity Questionnaire (IPAQ) Short Form was distributed in order to gather the primary data that were related to the education on the physical activity.

The reliability test for the questionnaires had been conducted prior to their distribution. From the results of reliability test toward the education on the eating pattern, the researchers found that the total item correlation had been ≥ 0.20 and the Alpha Cronbach had been ≥ 0.70. As a result, all of the question items were considered reliable and might be applied as the guidelines in conducting the study.

6. Data Analysis

The univariate data analysis was conducted in order to display the characteristic data and the descriptive data of the variables within this study. The continuous data sample was described using n parameter, mean, SD, minimum and maximum. On the other hand, the categorical data were described using n parameter and percentage.

Then, the bivariate analysis was conducted in order to analyze the influence of the independent variables toward the dependent variable using Pearson Product Moment Correlation test. For the multivariate analysis, the researchers selected the multiple linear regression.

RESULTS

The characteristics of the subjects generally described their distribution. The characteristics of 120 subjects in this study were viewed based on the age and the gender.

Table 1 showed that from 120 subjects, 22.50% subjects were 41-50 years old, 44.20% subjects were 51-60 years old, and 33.30% subjects were 61-70 years old. 71.70% subjects were female, while the remaining 28.30% were male.

Table 1. Study Subject Characteristics

Characteristics	Category	N	%
Age	41-50 years old	27	22.50
	51-60 years old	53	44.20
	61-70 years old	40	33.30
Gender	Male	34	28.30
	Female	86	71.70

The results of the continuous data descriptive statistics in the form of systolic blood pressure, club activity, education on the eating pattern, and education on the physical activity could be seen in Table 2. Table 2 showed that each variable had relatively small data variance. The mean value described the average score, while the standard deviation (SD) value described the data variance. The small SD value indicated that the data had been representative. The descriptive results of the categorical data in the form of health monitoring status, reminder, and home visit might be viewed in Table 3.

Table 2. Univariate Analysis of the Variables

Variables	n	Mean	SD	Min.	Max.
Systolic Blood Pressure	120	135.42	15.66	110	170.00
Club Activity	120	2.10	0.92	1	3.00
Education on the Eating Pattern	120	4.48	0.90	2.50	7.00
Education on the Physical Activity	120	21.99	6.71	12.60	43.20

Table 3 showed that from 120 subjects, 75.80% subjects routinely performed health monitoring status while the remaining 24.20% did not routinely performed health status monitoring. 102 subjects did not receive reminder SMS (85.00%) while 18 subjects received reminder SMS (15.00%). 98.30% subjects attained home visit while the remaining 1.70% did not attain home visit.

Table 3. Univariate Analysis of the Categorical Data Variables

Variables	n	%
Health Status Monitoring		
1. Not Routine	29	24.20
2. Routine	91	75.80
Reminder		
1. Not Receive Reminder SMS	102	85.00
2. Receive Reminder SMS	18	15.00
Home Visit		
1. Not Attain Home Visit	118	98.30
2. Attain Home Visit	2	1.70

Table 4. Bivariate Analysis on the Influence of Health Status Monitoring, Reminder, Club Activity, Education on the Eating Pattern, and Education on the Physical Activity toward the Systolic Blood Pressure of the Hypertension Patients

Variables	R	P
Health Status Monitoring	-0.27	0.003
Reminder	-0.16	0.079
Club Activity	-0.30	0.001
Home Visit	-0.13	0.161
Education on the Eating Pattern	-0.32	< 0.001
Education on the Physical Activity	-0.30	0.001

From Table 4, the results of pearson product moment correlation test regarding the influence of health status monitoring toward the systolic blood pressure of the hypertension patients showed that r = -0.27 with p= 0.003. This finding implied that there had been negative and statistically significant influence. The results of pearson product moment correlation regarding the influence of reminder toward the systolic blood pressure of the hypertension patients showed that r= 0.16 and p= 0.079. This finding implied that there had been negative and statistically insignificant influence.

The results of Pearson product moment correlation regarding the influence

of club activity toward the systolic blood pressure of hypertension patients showed that r = -0.30 with p = 0.001. This finding implied that there had been negative and statistically significant language. The results of Pearson product moment correlation regarding the influence of home visit toward the systolic blood pressure of the hypertension patients showed that r = -0.13 with p = 0.161. This finding implied that there had been negative and statistically insignificant influence.

The results of Pearson product moment correlation regarding the influence of education on the eating pattern toward the systolic blood pressure of the hypertension patients showed that r = -0.32 with p < 0.001. This finding implied that there had been negative and statistically significant influence. The results of Pearson product moment correlation regarding the influence of education on the physical activity toward the systolic blood pressure of

the hypertension patients showed that r = -0.30 with p = 0.001. This finding showed that there had been negative and statistically insignificant language.

Table 5 showed the results of multiple linear regressions regarding the influence of health status monitoring, reminder, club activity, home visit, education on the eating pattern, and education on the physical activity toward the systolic blood pressure of the hypertension patients.

There had been statistically significant influence from the health status monitoring toward the systolic blood pressure of the hypertension patients. The the hypertension patients who routinely performed health status monitoring had 6 mmHg lower systolic blood pressure in comparison to the hypertension patients who did not routinely perform health status monitoring (b = -6.34; CI 95% = -12.42 to -0.26; p = 0.041).

Table 5. Results of multiple linear regressions analysis

Variables	b	CI 95%		p
		Upper Limit	Lower Limit	
Constant		181.19	235.46	< 0.001
Health Status Monitoring	-6.34	-12.42	-0.26	0.041
Reminder	-6.22	-13.30	-0.87	0.085
Club Activity	-3.46	-6.40	-0.53	0.021
Home Visit	-22.01	-41.85	-2.17	0.030
Education on the Eating Pattern	-3.61	-6.66	-0.57	0.020
Education on the Physical Activity	-0.40	-0.79	-0.01	0.046
n =120				
R^2 =23.3				
p < 0.001				

There had been statistically significant influence from the club activity toward the systolic blood pressure of the hypertension patients. The hypertension patients who performed the club activity for 2-3 times in a month had 3 mmHg lower systolic blood pressure in comparison to the hypertension patients who performed the club activity once in a month (b = -3.46; CI 95% = -6.40 to -0.53; p = 0.021).

There had been statistically significant influence from the home visit toward the systolic blood pressure of the hypertension patients. The hypertension patients who had home visit had 22 mmHg lower systolic blood pressure than the hypertension patients who did not have the home visit (b= -22.01; CI 95% = -41.85 to -2.17; p= 0.030).

There had been statistically significant influence from the education on the eating pattern toward the systolic blood pressure of the hypertension patients. The hypertension patients who had high DASH eating pattern had 4 mmHg lower systolic blood pressure in comparison to the hypertension patients who had low DASH eating pattern (b = -3.61; CI 95% = -6.66 to -0.57; p = 0.020).

There had been statistically significant influence from the education on the physical activity toward the systolic blood pressure of the hypertension patients. The hypertension patients who had high physiccal activity had 0.40 mmHg lower systolic blood pressure in comparison to the hypertension patients who had low physical activity (b = -0.40; CI 95% = -0.79 to -0.01; p = 0.046).

R^2= 23.30% implied that the six independent variables (health status monitoring, reminder, club activity, home visit, education on the eating pattern, and education on the physical activity) had been able to 23.30% explain the factors that influenced the systolic blood pressure of the hypertension patients and the remaining 86.70% explanation had been given by the factors outside the study.

DISCUSSIONS

1. The influence of health status monitoring toward the blood pressure of the hypertension patients

The results of the study showed that there had been negative and statistically significant influence from the health status monitoring toward the systolic blood pressure of the hypertension patients.

Hypertension is a chronic disease that demands routine medication. Hypertension patients demand routine and regular medical control in order to identify the condition of their blood pressure so that they are able to prevent complications or more severe diseases (Sulastri, 2015).

The misunderstanding that hypertension always has symptoms occur in most of the hypertension patients. The absence of any symptoms causes the hypertension patients to abandon the blood pressure examination. This might be dangerous because hypertension is a "silent killer" (WHO, 2013).

According to Sudirman (2011) in Sulastri (2015), if the blood pressure cannot be decreased within one month then the dose can be adjusted to the maximum level or the patients might add other type of medicines. There is a relationship between the history of medical control and the relapses and this relationship show that routine and regular control is important to prevent the occurrence of relapses.

Hypertension demands lifetime governance and routine medical control is very important in maintaining the blood pressure of hypertension patients under control (Harianto, 2014).

2. The influence of reminder toward the blood pressure of the hypertension patients

The results of the study showed that there had been negative and statistically insignificant influence from the reminder toward the systolic blood pressure of the hypertension patients.

One of the problems in the hypertension therapy is the patients' disobedience toward the pharmacology and non-pharmacology therapy. This disobedience is caused by several factors such as knowledge and communication between the patients and the medical staff (Alfian, 2014).

According to Fenerty et al. (2012) in Alfian (2014), the use of new technology is recommended in order to help improving health. Short message service might be

benefitted in delivering messages of healthiness toward mobile phone owners.

The use of reminder short message service in order to increase obedience shows that the use of short message service is more innovative and has cost effectiveness. The use of reminder short message service application is easier in improving obedience within medication (Alfian, 2014).

The deliverance of short message as reminder and motivation for the hypertension patients provides positive influence toward behavior changes so that the hypertension patients improve their obedience and control toward the systolic and the diastolic blood pressure (Saputri et al., 2016).

This is in accordance with a study by Alfian (2014) who found that reminder short message service has positive influence toward significantly decreasing the blood pressure of the hypertension patients.

3. **The influence of club activity toward the blood pressure of the hypertension patients**

The results of this study showed that there had been negative and statistically significant influence from the club activity toward the systolic blood pressure of the hypertension patients.

Exercise is related to hypertension management because regular exercise can decrease periphery burden that will decrease the blood pressure (Anggara and Prayitno, 2013).

This is in accordance to a study by Lumampouw et al. (2016) who found that there is meaningful decrease on the systolic and diastolic blood pressure after performing *prolanis* exercises for four consecutive weeks.

According to Maryam (2008) in Werdani and Sawo (2015), regular exercises might respond in a response toward the cardiovascular namely the meaningful

blood pressure decrease. From a study by Werdani and Sawo (2015), it was found that the significant blood pressure decrease starts to occur from the fourth week.

A study by Liu et al. (2012) in Werdani and Sawo (2015) proposed that there is permanent systolic and diastolic blood pressure decrease on the fifth week after the exercise and the blood pressure decrease has been apparent from the first until the third week. The integrated control toward the blood pressure will occur during the exercise. The blood pressure is controlled reflexively through the autonomous nerve system, especially through a special sensor known as baroreceptor reflex that serves as the control toward the acute change of the blood pressure. Programmed and continuous exercise might improve the cardiovascular functions through the space expansion on the atrium and the ventricle within the heart and through the improvement of blood vessel elasticity.

After 16 weeks of exercises with moderate intensity, there are 7 mmHg decrease on the systolic blood pressure and 5 mmHg decrease on the diastolic blood pressure in the hypertension patients. The hypertension patients who do not perform exercises within the same period has small increase on their blood pressure (Kokkinos, 2009).

4. **The influence of home visit toward the blood pressure of the hypertension patients**

The results of the study showed that there had been negative and statistically significant influence from the home visit toward the systolic blood pressure of the hypertension patients.

The study by Phillipus (2002) in Triasih et al. (2007) proposes that the clients who attain home visit by the medical staff are 2.15 times more obedient in taking their medicines.

The results of this study are in accordance with those of Utami et al. (2013) which conclude that the elders who attain more routine home visit perform blood pressure control in comparison to the elders who do not attain routine home visit and that there are different systolic and diastolic blood pressures between the elders who have attained home visit and the elders who have not attained home visit.

5. **The influence of education on the eating pattern toward the blood pressure of the hypertension patients**

The results of this study showed that there had been negative and statistically significant influence from the education on the eating pattern toward the systolic blood pressure of the hypertension patients.

The governance of hypertension is lifetime and, therefore, the obedience of hypertension patients in attending to the education given by the medical staff is important in order to maintain the blood pressure under control (Harianto, 2014).

Decreasing the blood pressure among the hypertension patients can be achieved by applying the healthy eating pattern based on the DASH (Dietary Approaches to Stop Hypertension) eating plan. DASH eating plan emphasizes the intake of salt, fruit, vegetables, grains, low-fat dairy products, and food (Huang, 2008).

According to Ropaloza et al. (2015), DASH eating plan can decrease 6 mmHg systolic blood pressure and 3 mmHg diastolic blood pressure.

The study by Amran et al. (2010) shows that the blood pressure decreases after the consumption of fruit has been added to the daily menu in the breakfast, in the lunch, and in the dinner for 7 days consecutively. In general, the blood pressure decreases around 7.67 mmHg, the lowest decrease of systolic blood pressure is 3 mmHg, and the highest decrease of systolic blood pressure is 13 mmHg. The addition of fruit consumption on the daily menu causes the increase of potassium intake. Potassium causes the decrease on the systolic and the diastolic blood pressure.

6. **The influence of education on the physical activity toward the blood pressure of the hypertension patients.**

The results of this study showed that there had been negative and statistically significant influence from the education on the physical activity toward the systolic blood pressure of the hypertension patients.

Hypertension can be controlled through the regular improvement of physical activity (Werdani and Sawo, 2015). A study by Malekzadeh et al. (2013) shows that the decrease on the hypertension prevalence can be found in the people with higher physical activity. The moderate physical activity that is performed regularly can decrease the systolic and the diastolic blood pressure for 10 mmHg in 75% hypertension patients. The physical activity can be used as a choice of hypertension therapy for preventing complication.

A study by Gandasenta and Kusumaratna (2011) showed that the risk of hypertension occurrence within the group of high physical activity is 0.40 times lower than the risk of hypertension occurrence within the group of low physical activity. It is in accordance with the results of a prospective study which showed that there is an occurrence of hypertension decrease on 27,055 health women who perform regular physical activity (1,500 Kkal/week).

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