



Factors Associated with the Incidence of Uncontrolled Hypertension in Prolanis Patients in Semarang City

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Article Info

Article History:
Accepted
2 March 2021
Approved
28 April 2021
Published
23 December 2021

Keywords:
Factors Associated,
Uncontrolled
Hypertension.

Abstract

Hypertension is a serious medical condition that can increase the risk of heart failure, chronic kidney disease, brain disease and others. Hypertension is a major risk factor for global death. Uncontrolled hypertension was defined as a measure of systolic blood pressure ≥ 140 mmHg and diastolic blood pressure ≥ 90 mmHg based on the mean of three measurements in hypertensive patients and with or without antihypertensive treatment. Chronic disease management (Prolanis) is a proactive and integrated program that involves participants, health facilities, especially health centers and the national health insurance called BPJS which aims to encourage patients with chronic diseases to achieve optimal quality of life. The purpose of this study was to analyze the factors associated with the incidence of uncontrolled hypertension in Prolanis patients in Semarang City. This study used case control method. The research sample consisted of 148 respondents (74 cases and 74 controls) with a purposive sampling technique. The technique of collecting data by interview using a questionnaire. Data analysis was performed using the chi-square test and logistic regression. The results showed that there was a significant relationship between the variables of age ($p = 0.003$), education ($p = 0.032$), stress ($p = 0.023$) and cholesterol levels ($p = 0.008$) with the incidence of uncontrolled hypertension in Prolanis patients in Semarang City. The most related variable was age ($p = 0.028$, OR = 3.469). Increasing age related to risk factors for hypertension is supported by the presence of psychological problems such as stress, can be reduced by spiritual activity and the provision of health education about changes in the cardiovascular system and adaptation to lifestyle changes will be able to reduce uncontrolled hypertension factors.

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p-ISSN 2528-5998

e-ISSN 2540-7945

INTRODUCTION

Hypertension is a major cardiovascular risk factor and a major risk factor for global death 22% of adults >18 years of age worldwide have controlled blood pressure (systolic and diastolic blood pressure $\geq 140 / 90$ mmHg) in 2014. Consider to use alcohol abuse, being overweight and obese, physical inactivity, and high salt intake all contribute to the global incidence of hypertension (World Health Organisation. 2016).

Uncontrolled hypertension was defined as a measure of systolic blood pressure ≥ 140 mmHg and diastolic blood pressure ≥ 90 mmHg based on the mean of three measurements in hypertensive patients and with or without antihypertensive treatment. Controlled hypertension systolic blood pressure < 140 mmHg and diastolic blood pressure < 90 mmHg in people on antihypertensive treatment (Nerenberg et al., 2018).

Data from the World Health Organization (WHO) in 2015 showed that around 1.13 billion people in the world suffer from hypertension, meaning that 1 in 3 people in the world are diagnosed with hypertension. The number of hypertension sufferers continues to increase every year, it is estimated that by 2025 there will be 1.5 billion people affected by hypertension, and it is estimated that every year 10.44 million people die from hypertension and its complications (World Health Organisation. 2016).

Basic Health Research data in 2018 states that the prevalence of hypertension is based on measurement results in the population aged ≥ 18 years (34.1%), aged 31-44 years (31.6%), age 45-54 years (45.3%), age 55-64 years (55.2%), the highest case was in South Kalimantan (44.1%), while the lowest was in Papua (22.2%). The estimated number of hypertension cases in Indonesia is 63,309,620 people, while the death rate in Indonesia due to hypertension is 427,218 (0.67%) deaths. Reasons for hypertension sufferers not taking medication, among others are hypertension, hypertension sufferers feel healthy (59.8%), irregular visits to health care facilities (31.3%), take traditional medicine (14.5%), use other therapies (12.5%), forgot to take medicine (11.5%), unable to

buy medicine (8.1%), the side effects of the drug (4.5%) and unavailability of hypertension medication at the health care facility (2%).

Data from the pocket book Health of Central Java Province in 2019 showed that 238,269 people with hypertension (Data from BPJS Semarang in 2020 data on hypertension sufferers of 122,511 people (controlled hypertension 1,350 (1.1%) and uncontrolled 121,161 (98.9%)).

Uncontrolled hypertension has various causes, including demographic characteristics such as age, gender, health status, severity of hypertension, lack of self-care behavior, chronic diseases other than hypertension, and misguided doctor attitudes (Lee and Park. 2017). Age, education, occupation factors, body mass index, smoking habits, alcohol consumption, exercise habits, sodium intake, potassium intake were statistically associated with hypertension (Scanlon. 2010). Factors of age, partner status, salt consumption, coffee consumption, stress, and anti-hypertensive drugs consumption are associated with uncontrolled hypertension (Artiyaningrum and Azam. 2016). The cohort study conducted by Low identified several factors associated with uncontrolled hypertension, including race, single status, the number of drugs consumed, and the presence of depressive conditions (Low et al., 2015).

BPJS Kesehatan is one of national health insurance which organizes health program focussing on promotive, preventive, curative and rehabilitative actions. There are three promotive strategies and prevention implemented by BPJS Kesehatan, namely promotive and preventive strategies for healthy participants (health education, family planning services, and immunization services), promotive and preventive strategies for participants who are at risk (primary and secondary health screening, early detection of cancer), and promotive and preventive strategies for participants who are sick (Program Pengelolaan Penyakit Kronis/ *Prolanis*) (Latifah and Maryati. 2018).

Prolanis is a proactive and integrated program that involves participants, health facilities, especially health centers and BPJS which aims to

encourage patients with chronic diseases to achieve optimal quality of life. Apart from improving the quality of life for patients, this program is also expected to reduce the risk of complications and be able to take advantage of costs effectively and rationally. *Prolanis* consists of 6 activities, those are medical consultation, education, SMS gate-away, home visit, club activities, and monitoring of health status. Based on the results of previous studies, *Prolanis* in several areas is effective in reducing blood pressure in hypertensive patients (BPJS. 2014).

This program has been implemented and various optimization efforts have been made. Pharmacists work with doctors in providing education to patients about hypertension, monitoring patient responses through community pharmacies, adherence to drug and non-drug therapies, early detection and recognition of side effect reactions, and preventing and or solving problems related to drug administration (Mahmudah et al., 2017).

Based on uncontrolled hypertension cases in Semarang City, amounting to 121,161 people and 1,350 cases and controlled hypertension, the researchers will conduct research on the analysis of factors related to the incidence of uncontrolled hypertension in *Prolanis* patients in Semarang City.

METHODS

The research design was analytic observational with case control method. The case population was uncontrolled hypertension patients who participated in the *Prolanis* program at the public health centers, while the control population was hypertensive patients with controlled blood pressure who attended the *Prolanis* program at the public health centers in Semarang City.

The case sample in this study were uncontrolled hypertension patients who participated in the study *Prolanis* program at Kedung Mundu and Telogosari Wetan Public Health Centre in Semarang City and the control samples were hypertensive patients with controlled blood pressure participating in the *Prolanis* program at Kedung Mundu and Telogosari Wetan Puskesmas Public Health Centre in Semarang City.

The sample of this research is 74 cases and 74 controls. The sampling technique was *purposive sampling*. The independent variables of this study include age, gender, employment status, marital status, education, salt consumption, smoking habits, exercise habits, coffee drinking habits, stress, adherence to take antihypertensive drugs, family support, history of diabetes mellitus, total cholesterol levels, and referral to health services. The dependent variable of the study was *Prolanis* patients with uncontrolled hypertension. The technique of collecting data by interview using a questionnaire. This study uses univariate analysis techniques to present the frequency distribution of each variable, bivariate using the Chi Square Test for analyzing the relationship between independent and dependent variables. Variables with bivariate analysis p value < 0.25 were included in the multivariate analysis with logistic regression to identify the variables that had the most influence on the incidence of uncontrolled hypertension in *Prolanis* patients in Semarang City.

RESULTS AND DISCUSSION

Based on the results of the analysis in table 1 it can be seen that the variables related with the incidence of uncontrolled hypertension in *Prolanis* patients in Semarang City are age, education, stress and total cholesterol levels.

Table 1. Bivariate analyze factors related to the incidence of uncontrolled hypertension in *Prolanis* patients in Semarang City.

Variabels	Cases		Control		Total	*P-Value
	F	%	F	%		
Age					148	0.003
< 50 years	18	12.2	5	3.4		
≥ 50 years	56	37.8	69	46.6		
Gender					148	0.576
Male	21	14.2	18	12.2		
Female	53	35.8	56	37.8		
Education level					148	0.032
Low	46	31.1	33	22.3		
High	28	18.9	41	27.7		
Married					148	0.604
Unmarried	27	18.2	24	16.2		
Married	47	31.8	50	33.8		
Employment Status					148	1.000
Unemployed	56	37.8	56	37.8		
Employed	18	12.2	18	12.2		
Natrium Intake					148	1.000
High (≥ 6 gr/> 3 tea spoon)	12	8.1	12	8.1		
Normal (< 6gr/≤3 tea spoon)	62	41.9	62	41.9		
Smoking Habbit					148	0.347
No Smoking	70	47.3	67	45.3		
Smoking	4	2.7	7	4.7		
Activity					148	0.856
No	22	14.9	21	14.2		
Activity	52	35.1	53	35.8		
Coffe Consumption					148	0.554
No	59	39.9	56	37.8		
Yes	15	10.1	18	12.2		
Stress					148	0.023
Yes	9	6.1	20	13.5		
No	65	43.9	54	36.5		
Compliance Taking medicine					148	0.754
No	6	4.1	5	3.4		
Yes	68	45.9	69	46.6		
Family Support					148	1.000
Not Good	5	3.4	5	3.4		
Good	69	50	69	50		
Diabetes Mellitus					148	1.408
No	35	23	30	20.3		
Yes	39	26.4	44	29.7		
Cholesterol Total					148	0.008
Abnormal (>200mg/dl)	42	56.8	26	35.1		
Normal (≤200mg/dl)	32	43.2	48	64.9		
Refer to specialist doctor					148	0.806
No	63	43.2	64	43.8		
Yes	10	6.8	9	6.2		

From the socio-demographic factors, the variables of older age (> 50 years) and lower education influence the perception of hypertension.

Older people with sedentary lifestyles are very likely to have no control over their blood pressure. It is possible that other comorbidities have a negative

impact on them (Kanungo et al., 2017). The aging process and the increase in blood pressure values are the main factors in the occurrence of hypertension in the elderly. Increased blood level in the elderly is a normal condition, but maintaining blood pressure at controlled levels is very difficult (Santschi et al., 2017). A study in Shanghai showed that hypertension was related to with various factors such as age, Body Mass Index (BMI), low education, diet, alcohol and non-comorbidity (Yang et al., 2017). Another study in Delhi also showed that the strong factors associated with hypertension are age, education, and also cholesterol levels (Kishore et al., 2016). Other studies also showed that age and education are associated with uncontrolled hypertension (Yunanto et al., 2019; Bansal et al., 2012; Belachew et al., 2018; Dhungana et al., 2016). Education plays an important role in maintaining health against diseases influenced by lifestyle. The level of education is an important factor for someone to be able to understand new information and to apply it for overcoming health problems. The level of education is an influential factor in obtaining information and subsequently influences health-seeking behavior among the elderly in developing countries (Irwan et al., 2016). These results indicate that education has a great influence on the elderly in understanding their health status. Structured health education for *Prolanis* patients is an alternative to improve their ability to control blood pressure.

This study also shows that stress is associated with uncontrolled hypertension. Both stressed and hypertensive patients have increased sympathetic tone and increased secretion of adrenocorticotrophic hormones and cortisol. Therefore, it is pathophysiology plausible that stress and hypertension influence each other. Dopamine and other related neurotransmitters have antihypertensive action; Bromocriptine and fenoldopam, which are dopamine receptor agonists, have been used in the management of high blood pressure. Dopamine deficiency in the brain can

increase blood pressure and trigger stress (RubioGuerra et al., 2013).

Similar research findings are also shown in previous studies which stated that stress is associated with uncontrolled hypertension (Khamechian et al., 2013; Chang and Lee. 2015; Neupane et al., 2015; Liu and Byrd., 2017; Khotimah. 2013). Spruill also stated that psychosocial stress factors contribute positively to hypertension (Spruill. 2013).

In table 1 it can also be seen that total cholesterol levels are associated with uncontrolled hypertension in *Prolanis* patients in Semarang City. Excessive fat consumption can increase the risk of hypertension because it will increase cholesterol levels in the blood. Cholesterol will stick to the walls of blood vessels, which over time will become clogged due to the presence of plaque in the blood which is called atherosclerosis. The plaque erase it formed will cause blood flow to narrow so that blood volume and blood pressure will increase (Salman et al., 2020).

In hypertensive patients, approximately 50-80% experience dyslipidemia (Arshad et al., 2016). In line with the results of this study indicate that the majority of patients have high total cholesterol levels and it is associated with the incidence of hypertension in *Prolanis* patients in Semarang City. The results of this study support the research of Ulfah (2017) which states that there is a significant effect of total cholesterol on blood pressure (Ulfah and Sukandar. 2016). Fat deposits block blood flow through the arteries, both of these factors tend to increase blood pressure (Wade et al., 2016; Sudaryanto et al., 2019; Alatab et al., 2014; Arshad et al., 2016). If lipid disorders lead to hypertension, it is true and logical that pharmacological treatment of dyslipidemia lowers blood pressure (Jani et al., 2014). Typically prescribed to treat dyslipidemia, high-intensity statins and moderate-intensity statins were used by 86% of participants with controlled blood pressure and by 32% of participants with uncontrolled blood pressure. Statins are considered safe, providing significant cardiovascular benefits in different

populations including the elderly and patients with diabetes. There are some evidence to suggest dyslipidemia treatments have a beneficial effect on blood pressure. Patients receiving antihypertensive and statin therapy simultaneously experienced an unexplained drop in blood pressure solely because of the lipid-lowering effect of the statin or the effect of antihypertensive drugs.

The results showed that the use of statins in combination with antihypertensive drugs might improve blood pressure control in patients with uncontrolled hypertension and high serum cholesterol levels (Jani et al., 2014).

Dyslipidemia conditions in hypertensive patients are need serious handling by setting the results are less valid. Every person who wants to consumption high fiber diet and reduced total intake of fat and salt and doing regular exercise (Sihombing. 2017). Management of additional measures including dietary and pharmacological treatments are needed to lower lipids so that blood pressure can be controlled (Arshad et al., 2016).

Another factor that can cause an increase in cholesterol levels after therapy is not fasting before checking cholesterol levels which causes a do a lipid profile check, fasting should first do a minimum of 10 hours of fasting (Suryanta and Septiana. 2016).

The results of this study imply that lipid profiles and blood pressure measurements are very important for individuals with hypertension. Alteration of lipid profiles is an early feature of metabolic syndrome and is associated with impaired lipid metabolism, high plasma triglyceride levels and low HDL levels which are closely associated with hypertension and cardiovascular disease (Yadav *et al.*, 2019).

Based on table 2, the results of the multivariate analysis showed that the most associated factor with the incidence of uncontrolled hypertension in Prolanis patients in Semarang City was age with p-value = 0.028 with OR = 3.469.

Table 2. Multivariate Analysis of Factors Associated with the Incidence of Uncontrolled Hypertension in Prolanis Patients in Semarang City.

Variabel	OR	P-Value
Age	3.469(1.147-10.491)	0.028
Education	1.838 (0.908-3.722)	0.091
Stress	0.344 (0.138-0.860)	0.032
Cholesterol	2.244(1.092-4.610)	0.028
Konstanta	1.723	0.558

CONCLUSION

There is a relationship between age, education, stress and total cholesterol levels with uncontrolled hypertension in Prolanis patients in Semarang City. The factor most related to the incidence of uncontrolled hypertension in Prolanis patients in Semarang City is age. Increasing age related to hypertension risk factors is supported by psychological problems such as stress, can be reduced by spiritual activity and providing health education about changes in the cardiovascular system and adaptation to lifestyle changes will be able to reduce factors uncontrolled hypertension.

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