

Analysis of the relationship between treatment patterns based on patient characteristics in cases of hypertension complications at PKU Muhammadiyah Gamping Hospital

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ABSTRACT

Background : The percentage of complication hypertension in Indonesia is cerebrovascular disease 21.6%, heart disease 40.9%, and kidney disease 33.2%. Yogyakarta is one of the provinces in Indonesia with a prevalence of complication hypertension of 32.86%. Combination of antihypertensive drugs is needed to replace the old treatment concept. Starting hypertension therapy with a combination is still controversial.

Objective : To analyze the relationship between treatment patterns based on sociodemographic characteristics in hypertensive inpatients who had complications at PKU Muhammadiyah Gamping Hospital.

Methods: This study was analytical research methods using retrospective methods. The sampling technique in this study used the total sampling technique. The variables used in this study were patterns of antihypertensive drug use associated with sociodemographic factors including gender, age, and patient health insurance, systolic and diastolic blood pressure. The Data analyzed by Chi-Square test and Kendall's tau-b test.

Results: Sociodemographic characteristics of respondents include: elderly (83.3%), male and female gender (50.0%), BPJS coverage (91.7%). Hypertensive disease complications include: stroke (20.8%), myocardial infarction (4.2%), kidney failure (4.2%), heart failure (33.3%), diabetes mellitus (37.5%). The drug combination pattern prescribed was generally CCB and ARB. The Chi-square test showed age, gender, health insurance were no relationship ($P > 0.05$). The kendall-tau test showed 0,674 (systolic) and 0,929 (diastolic).

Conclusion: Based on Chi-square and Kendall-tau tests there was not a significant relationship between sociodemographic characteristics with treatment patterns and blood pressure with treatment pattern in cases of complication hypertension at PKU Muhammadiyah Gamping Hospital.

KEYWORD: hypertension complications; sociodemographics; treatment pattern; retrospective; hospital

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INTRODUCTION

Cases of hypertension are often called "The Silent Disease" or a silent disease, because some people do not know that they suffer from hypertension. Hypertension can also affect people from various groups, ages, social and economic status(1). The number of cases of hypertension in Indonesia is 63,309,620 patients, while the death rate due to hypertension in Indonesia is 427,218 people (Risikesdas, 2018) (2). It is estimated that 1.5 billion people will suffer from high blood pressure in 2025. Every year, an estimated 9.4 million people die from hypertension and complications (Ministry of Health, RI. 2019)(3).

Hypertension & complications seem to be one of the number one causes of death. Blood vessel complications caused by hypertension can result in coronary heart disease, heart infarction (tissue damage), stroke, and kidney failure. Based on the results of Risikesdas 2018, it was stated that the prevalence of hypertension rose to around 25.8% in 2013 and increased to 34.1% in 2018 (4). Combination of anti-hypertensive drugs is needed to replace the old treatment concept. Starting hypertension therapy with a combination is still controversial. Complicated hypertension requires the right combination of drugs to reduce morbidity and mortality (5). The therapeutic strategy must include lifestyle changes, BP control to target and the effective treatment of the other risk factors to reduce the residual cardiovascular risk(6). According

to the result of the research survey and reference study, it was clear that there has been no research similar to this research. For this reason, research on drug use patterns in health facilities was conducted. This study highlights the relationship between treatment patterns based on patient characteristics in cases of complicated hypertension at PKU Muhammadiyah Gamping Hospital.

MATERIALS AND METHODS

This research used a descriptive analytical research design with a retrospective approach. This research was conducted at PKU Muhammadiyah Gamping Hospital in July 2023 in which 24 patients had been diagnosed with hypertension and had complications. In this study all of the patients were analyzed by total sampling. The researcher collected medical record's patient from January until December 2022. The sample criteria used in this study were patients undergoing inpatient treatment with a diagnosis of hypertension complications such as heart disease; kidney failure; myocardial infarction; and stroke, and patients who received antihypertensive drug therapy recorded in the medical record. The variable The data taken were gender, age, health insurance, type of complication hypertension, the patient's blood pressure, the drugs used by patients. This research had received permission from the hospital with permission number: 130/KEP-PKU/VII/2023 and also obtained permission from the university with permission number: KE/AA/VI/1011155/

RESULTS AND DISCUSSION

RESULTS

Sociodemographic Characteristics

Detailed sociodemographic characteristics of patients can be seen in **Table 1**. The most common complication of hypertension in the elderly is experienced by

women with 12 people (50.0%) and 12 men (50.0%). Another research explained that the distribution of sociodemographic characteristics of male gender was found by 39 respondents (50.0%) and female gender was obtained by 39 respondents (50.0%) in inpatient hypertension patients at H. Hanafie Muara Bungo Regional Hospital (4). The age group that suffers most from complicated

Table 1. Distribution of sociodemographic characteristics of inpatient complicated hypertension patients at PKU Muhammadiyah Gamping Hospital

Characteristics	Category	Frequency (n = 24)	Percentage (%)
Age	Adults ≤ 45 years	4	16.7
	Elderly > 45 years	20	83.3
Gender	Man	12	50.0
	Woman	12	50.0
Treatment Guarantee	General	2	8.3
	BPJS	22	91.7
Hypertension Complications	Diabetes Mellitus	9	37.5
	Heart Failure	8	33.3
	Stroke	5	20.8
	Kidney Failure	1	4.2
	Myocardial Infarction	1	4.2

hypertension is 46-82 years old with a percentage of 83.3%. This is also in accordance with the theory that blood pressure generally increases starting from the age of ± 40 years. Then after the age of 40 years, the arterial walls will thicken due to the buildup of collagen in the muscle layer, so that the blood vessels will gradually narrow and become stiff (7). Blood pressure can also increase as a person ages. Of individuals aged over 60 years, 50-60% have blood pressure greater than or equal to 140/90 mmHg. This means the influence of degeneration that occurs in

people as they age(4).

Patterns of Drug Use in Complicated Hypertension Patients

The patterns of drug use in complicated hypertension can be seen at **Table 2**. **Table 2** showed that the highest percentage of use of single therapy was in the CCB group, namely 12.5% (3 respondents), the highest combination therapy was in the CCB+ARB group, 25% (6 respondents), the 3 drug combination therapy was the highest CCB + ACEI + BB group, namely 8.3% (2

respondents), and drug combination therapy in the BB + CCB + Alfa Sentral + ARB group with a percentage of 4.16% (1 respondent).

Relationship between sociodemographic characteristics and drug use patterns in hospitalized complicated hypertension

patients

Based on **Table 3**, the results of the *Chi-Square* statistical test showed that the p-value for age was 1,000 (< 0.05), which means there is no significant relationship between age and drug use patterns.

Table 2. Use of antihypertensive drug class therapy in inpatient complicated hypertension patients at PKU Muhammadiyah Gamping Hospital

Therapy	Antihypertensive Drug Classes	Frequency (n=24)	Percentage (100%)
Single	ARB	1	4.16
	CCB	3	12.5
Combination of 2 Drugs	CCB + ARB	6	25.0
	BB + ARB	4	16.66
	CCB + ACEI	1	4.16
	BB + ACEI	2	8.3
Combination of 3 Drugs	CCB ^{a/b} + ACEI + BB	2	8.3
	CCB ^a + ARB + AS	2	8.3
	CCB ^a + CCB ^b + ARB	1	4.16
	CCB ^a + ARB + BB	1	4.16
Combination of 4 Drugs	BB + CCB + AS + ARB	1	4.16

Notes :

- ARB : *Angiotensin Receptor Blocker (candesrtan)*
- CCB : *Calcium Channel Blocker (amlodipin^a; nifedipin^b)*
- ACEI : *Angiotensin Converting Enzyme Inhibitors (Captopril/lisinopril/ramipril)*
- BB : *Beta Blocker (Bisoprolol)*
- AS : *Alfa Sentral (Clonidin)*

Table 3. Relationship between sociodemographic characteristics and medication use patterns in inpatient complicated hypertension patients at PKU Muhammadiyah Gamping Hospital

Sociodemography	Use of Antihypertensive Drugs				Total	p-value	
	Single		Combination				
	f	%	f	%			
Age							
Mature	0	0	4	100	4	16.7	1
Elderly	4	20	16	80	20	83.3	
Gender							
Man	2	16.7	10	83.3	12	50	1
Woman	2	16.7	10	83.3	12	50	
Health Insurance							
Non BPJS	0	0	2	100	2	8.3	1
BPJS	4	18.2	18	81.8	22	91.7	

Table 4. The Relationship between systolic blood pressure and drug use patterns in hypertension patients with inpatient complications at PKU Muhammadiyah Gamping Hospital

Blood Pressure	Use of Antihypertensive Drugs				Total		p-value	Correlation Coefisien
	Single		Combination		f	%		
	f	%	f	%				
Normal High	2	8.3	2	8.3	4	16.7	0.674	0.084
Stage 1 hypertension	0	0	11	45.8	11	45.8		
Stage 2 hypertension	2	8.3	7	29.2	9	37.5		

Note: SBP (Systolic Blood Pressure) were analyzed using the kendall-tahu statistical test with α : 5%; CI: 95%.

Table 5. The Relationship between diastolic blood pressure and drug use patterns in hypertension patients with inpatient complications at PKU Muhammadiyah Gamping Hospital

Blood Pressure	Use of Antihypertensive Drugs				Total		p-value	Correlation Coefisien
	Single		Combination		f	%		
	f	%	f	%				
Normal High	2	8.3	2	8.3	4	16.7	0.929	-0.018
Stage 1 hypertension	0	0	11	45.8	11	45.8		
Stage 2 hypertension	2	8.3	7	29.2	9	37.5		

Note: DBP (Diastolic Blood Pressure) were analyzed using the kendall-tau statistical test with α : 5%; CI: 95%.

Relationship between blood pressure and drug use patterns in hospitalized complicated hypertension patients

Based on the results of Kendall's tau-b statistical test between blood pressure and treatment pattern, the p-value of SBP was 0.674 and p-value of DBP was 0.929. It meant there was no relationship between blood pressure and treatment patterns. The results of this study were slightly different from research conducted by Nabilla Putri Pratiwi, et al. In previous research, there was a relationship between blood pressure and drug use patterns with p-value of $0.00 < 0.05$ (22).

DISCUSSION

Sociodemographic Characteristics

Based on **Table 1**, the results of this research are also slightly different from previous research conducted by Dian Sa'idah and her friends at RSUD Dr. Soegiri Lamongan who explained that women are more dominant than men. It is also said that the mechanism of the impact of gender differences on increasing blood pressure is not yet known in detail, but many studies have linked it to the hormonal system in the body. The estrogen hormone is a hormone that also influences the development of hypertension, where the estrogen hormone also plays a role in increasing High Density Lipoprotein (HDL) levels. High levels of High Density Lipoprotein (HDL) are a protective factor against atherosclerosis, where atherosclerosis can

also cause hypertension (7). One of the services that BPJS Health participants receive is the Referral Program (PRB) service, where patients with chronic illnesses who are in a stable condition are also entitled to receive long-term treatment for a maximum of 30 days per use. There are 9 types of diseases included in PRB, namely hypertension, diabetes mellitus, heart disease, stroke, asthma, chronic obstructive pulmonary disease, epilepsy, schizophrenia and systemic lupus erythematosus (8).

Detailed patient characteristics can be seen in **Table 1** The most common complication of hypertension is diabetes mellitus with a total of 9 people (37.5%). DM is often caused by metabolic disorders that occur in the pancreas organ which is characterized by an increase in blood sugar or what is often called hyperglycemia which can be caused by a decrease in the amount of insulin originating from the pancreas organ. Diabetes mellitus can also cause various complications, both macrovascular and microvascular. Diabetes mellitus can also cause cardiovascular disorders which are relatively serious diseases and if treatment is not given immediately, it can increase blood pressure or hypertension as well as heart infarction (9). Heart failure is a complication of uncontrolled hypertension. In the CARDIA Study which began in 1985-1986, it was found that 19% of cases with uncontrolled blood pressure suffered from heart failure. In some cases, someone who suffers from hypertension has the potential to experience a stroke. Hyper-

tension can be seen as a risk factor for stroke, especially if the sufferer is under pressure and at a high level. A person suffering from hypertension will experience an aneurysm accompanied by endothelial dysfunction in the blood vessel tissue. If the disturbance that occurs in these blood vessels continues for a long time it can cause a stroke. This could mean that a person's hypertension status can determine how likely they are to have a stroke, and patients who do not suffer from hypertension may have a very small risk of having a stroke (10). Mentari research in 2017 on 46 inpatients at Dr. M. Yunus Bengkulu for the period of January 2016 found a high prevalence of CHD (100%), and there was a relationship between hypertension and CHD ($p=0.005$), and a prevalence ratio (RP) value of 2.11 with a confidence interval (IK) of 95% (11).

Based on **Table 2**, From the guidelines for managing hypertension therapy, JNC VIII states that initial treatment of hypertension does not require a combination of 2 drugs but only requires single therapy. Combination therapy can be used if the patient with single therapy does not reach the blood pressure that should be. Combination therapy in hypertensive patients who receive the first treatment can also cause a rapid and strong decrease in blood pressure which can result in an uncontrolled decrease in blood pressure. Antihypertensives can also be used as single, combination or replacement therapy. Replacement of antihypertensives is the use of drugs alone, then in combination

and vice versa, or the use of drugs in combination which can be replaced as long as it is with a different group. The use of single therapy can be given to mild hypertension to avoid hypotension, while the use of combination therapy can also be given to patients with severe hypertension who cannot be treated using single therapy. Combination therapy and drug replacement can also use 2 or more classes of antihypertensives depending on the patient's condition (10)(6). A combination of antihypertensive drugs can reduce blood pressure to a greater extent with minimal side effects. Using a combination of antihypertensives at low doses is more effective in reducing the incidence of side effects compared to using antihypertensive monotherapy using high doses.

Antihypertensive treatment therapy does not only consist of a single antihypertensive but some also use a combination of 2 or more antihypertensive drugs (5)(6). The treatment algorithm for hypertension in the early stages or stage I hypertension mostly uses single therapy (6). At the stage I hypertension can use 1 type of antihypertensive drug. Meanwhile, combination therapy is given to hypertensive patients who are at stage 2 or accompanied by other cardiovascular disease complications, such as: diabetes mellitus and heart failure. Giving 2 types of medication is also a recommended therapy if blood pressure is found to be more than 20/10 mmHg above the specified blood pressure target (12). Previous research also stated that drug therapy regimens greatly

influence patient non-compliance in using antihypertensive drugs. The large amount of medication that a patient must take can be a reason for the patient to be non-compliant with treatment. This reason could be because the patient feels bored with the medication he is taking during the treatment period. Apart from that, the use of too many combination therapies can make it difficult for patients to follow the antihypertensive drug treatment regimen (13)(14).

At Windusari's Health Center, single prescriptions were more than combinations, which was 76.72%. The most prescribed antihypertensive drugs are ACEI 61.81%. The most prescribed ACEI group was captopril at 79.31%. The most widely prescribed combination of antihypertensive drugs was a combination of ACEI and diuretics at 84.10% (15). A study at Surakarta Hospital showed that the most combinations of antihypertensive drugs were the CCB and ARB groups (16). This is in line with research conducted by researchers that CCB and ARB were used too in treatment. The stock of drugs in hospitals is more diverse than in health centers, so the combinations of drugs used also have many varieties. It will affect the clinical outcome of treatment.

Relationship between sociodemographic characteristics and drug use patterns in hospitalized complicated hypertension patients

Based on **Table 3**, it was similar with Sigarlaki's research, that the older a person is,

the more likely they are to suffer from hypertension complications. This is because at that age the large arteries lose their flexibility and become stiff, therefore the blood with each heart beat is forced to pass through narrower blood vessels than the blood vessels in general and this results in an increase in blood pressure. This continuous increase can cause left ventricular hypertrophy due to prolonged suffering from uncontrolled hypertension. It is also a risk factor for cerebrovascular and kidney disease (17).

It was also found that the *p-value* for gender was 1.000 (< 0.05), which means there was no significant relationship between gender and drug use patterns. The results of this research are also slightly different from previous research conducted by Dian Sa'idah and her friends at RSUD Dr. Soegiri Lamongan who explained that women are more dominant than men. It is also said that the mechanism of the impact of gender differences on increasing blood pressure is not yet known in detail, but many studies have linked it to the hormonal system in the body. The estrogen hormone is a hormone that also influences the development of hypertension, where the estrogen hormone also plays a role in increasing High Density Lipoprotein (HDL) levels. High levels of High Density Lipoprotein (HDL) are a protective factor against atherosclerosis, where atherosclerosis can also cause hypertension (18). **Table 3** showed that the *p-value* for health insurance was 1.000 (< 0.05), which means there is no

relationship between health insurance and drug use patterns. This research is supported by Harnanto (2010), who explains that patients who pay directly experience high service quality when compared to indirect payments (19). National Health Insurance (JKN) has been officially implemented by BPJS (Social Security Administering Body). In accordance with the regulations of the Republic of Indonesia Minister of Health Regulation No. 28 of 2014, JKN is health protection based on the principles of social insurance contributions and equity so that participants receive the benefits of health care and protection. Participants are required to pay their own fees or have their fees paid by the government (8). One of the services that BPJS Health participants receive is the Referral Program (PRB) service, where patients with chronic illnesses who are in a stable condition are also entitled to receive long-term treatment for a maximum of 30 days per use. There are 9 types of diseases included in PRB, namely hypertension, diabetes mellitus, heart disease, stroke, asthma, chronic obstructive pulmonary disease, epilepsy, schizophrenia and systemic lupus erythematosus. Health service users demand quality services, not only regarding the recovery from physical illness but also regarding satisfaction with the attitude, knowledge and skills of officers in providing services as well as the availability of adequate facilities and infrastructure that can provide comfort. With the increasing quality of service, the service function in health

facilities needs to be improved to be more effective and efficient and provide satisfaction to patients and the community(20).

In this case all variables were not statistically significant. This research was not inline with the existing theories. The treatment pattern was not related to age, type of sex, or health insurance. The results of this study are strengthened by the research of Sari & Susanti which stated that there was no correlation between sex and the incidence of hypertension with heart in the elderly at the Nglegok Health Center, Blitar Regency in August 2016 with a p-value 0,130(21).

Relationship between blood pressure and drug use patterns in hospitalized complicated hypertension patients

From research conducted by Yulianti, et al, it is said that patients suffering from hypertension often use combination therapy to control their blood pressure rather than single therapy or monotherapy. This is also related to the decrease in organ function experienced by the patient (12). From research conducted by Mazza, it is also said that in general, only 30% of hypertensive patients can control their blood pressure using single therapy (monotherapy). The remainder require combination therapy of 2 or 3 antihypertensive drugs to achieve the target blood pressure. This can be caused because patients suffering from hypertension often have more than one chronic disease, and this is one of the factors that can influence the choice of the type of antihypertensive to be

used (23). The average blood pressure of research subjects was systolic blood pressure between 140-159 mmHg and diastolic blood pressure 90-99 mmHg. Which means that most patients have uncontrolled blood pressure. According to JNC VIII, a person experiencing hypertension is characterized by an increase in systolic blood pressure ≥ 140 mmHg and diastolic blood pressure ≥ 90 mmHg (24). This research is also in line with research conducted at the Depok Yogyakarta Community Health Center where researchers also concluded that the majority of subjects had uncontrolled blood pressure(25). The main cause of uncontrolled blood pressure is poor compliance with antihypertensive medication (6). Research conducted by Hoer, et al., showed that low compliance with hypertension therapy is the main cause of uncontrolled blood pressure (6). Age, level of knowledge, and patient lifestyle affect the success of therapy(26)(27)(28)(29).

CONCLUSION AND RECOMMENDATION

Based on the results of data analysis and discussions that have been carried out in this research, it can be concluded as follows: description of the sociodemographic characteristics of inpatients with a diagnosis of complicated hypertension at PKU Muhammadiyah Gamping Hospital, aged adults (25-40 years) and elderly (50-80 years), male and female, using BPJS and non BPJS health insurance. The treatment pattern of inpatients diagnosed with complicated

hypertension at PKU Muhammadiyah Gamping Hospital who underwent single therapy were mostly in the CCB group, namely 3 respondents (12.5%), combination therapy with 2 drugs was mostly in the CCB + ARB group, namely 6 respondents. (25%), combination therapy with 3 drugs was mostly in the CCB + ACEI + BB group with 2 respondents (8.3%), and combination therapy with 4 drugs was in the BB + CCB + Alfa Sentral + ARB group with 1 respondent (4.16%). Age, level of knowledge, and patient's lifestyle affect the success of therapy.

There was no relationship between sociodemographic characteristics and drug use patterns in complicated hypertension patients at PKU Muhammadiyah Gamping Hospital, Yogyakarta. There was no relationship between systolic and diastolic blood pressure and drug use patterns in complicated hypertension patients at PKU Muhammadiyah Gamping Hospital, Yogyakarta. So that this research can be continued by other researchers, other researchers are expected to increase the number of research samples and use prospective methods. Seeing that this study only took the population and samples from January to December 2022 and also did not monitor the patient's blood pressure history directly.

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