

Effectiveness of Drugs Therapy of Hypertensive Patients in Undata General Hospital Palu

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Abstract

Increased blood pressure above normal will result in increased morbidity and mortality by improving risk factor for other diseases. Data obtained from Undata General Hospital Palu, showed the number of hypertensive patients died in 2016 as many as 513 patients, this number increased in 2017 as many as 637 patients. This study aims to determine the accuracy of the selection of antihypertension therapy and dose as well as determine the effect of antihypertension drugs to decrease blood pressure in hypertensive patients in hospitalized Undata General Hospital Palu in 2016-2017. This study uses a quantitative method with retrospective approach. The results showed that the most significant decrease in blood pressure based on length of stay occurred in patients with 4-7 days of stay ie 42.64/21.17 mmHg and the most significant reduction in blood pressure based on the treatment regimen occurred in three combination antihypertension 57.14/28.57 mmHg with a significance value of $p < 0.05$. So we concluded the accuracy of therapy and dose in hypertensive patients based on the guidelines JNCVII showed a patient diagnosed with mild, moderate, and severe hypertension overall proper drug selection and dose received by all patients with hypertension better use of antihypertension drugs singly or in combination in accordance with the standards of the JNCVII, and paired t-test for hypertensive patients with a single drug decreased blood pressure 37.80/16.19 mmHg ($p < 0.05$), hypertensive patients with two combinations of drugs decreased blood pressure 29.26/18.94 mmHg ($p < 0.05$) and hypertensive patients with three combinations of drugs decreased blood pressure 57.14/28.5 mmHg ($p < 0.05$).

Keywords: *Effectiveness, Drugs Therapy, Undata General Hospital, Hypertension.*

Introduction

Hypertension is a condition where a person has a blood pressure of 140 mmHg or higher and diastolic blood pressure of 90 mmHg or more [1]. Increased blood pressure above normal will result in increased morbidity and mortality. Hypertension is caused by an increase in peripheral vascular smooth muscle tone, which causes an increase in resistance arterioles and veins decrease in system capacity [2].

Based on data from the Health Research [3] carried out by the Agency for Health Research and Development of the Ministry of Health (2013), the prevalence of patients with hypertension in Indonesia of 9.5% and in the central Sulawesi has a prevalence of 11.9% whereas in the Palu City have prevalence of 10.2%. Based on Sulawesi Health Office [4], Division of Disease Control

and Environmental Health (P2PL), that the total number of hypertension cases decreased, ie 78.589 cases in 2013, 76.726 cases in 2014, and 72.120 cases in 2015. The goal of hypertension therapy is reduction in mortality and morbidity associated with this disease.

The mortality and morbidity associated with target organ damage eg cardiovascular or cerebrovascular events, heart failure, and kidney disease as well as reduce the risk of hypertension therapy is the main goal, and the choice of drug therapy significantly influenced by evidence of risk reduction [5]. So the need for an effective treatment for the hypertensive patients. Treatment of hypertension is broadly divided into two types: non-pharmacological and pharmacological.

Nonpharmacological therapy of hypertension is weight loss, planning Dietary Approaches to Stop Hypertension (DASH), reducing sodium intake, physical activity and limit intake of alcohol while pharmacological therapy is used to control blood pressure is Angiotensin Converting Enzyme (ACE) inhibitors, Angiotensin Receptor Blocker (ARBs), Calcium Channel Blockers (CCB), Diuretics, Beta-blockers, Aldosterone Antagonists, Direct Vasodilators, Alpha-Blockers [6].

Data obtained from the medical records of Undata General Hospital Palu, hypertension entered into the order of the second case with a number of 61 patients of ten top diseases in January 2018 and the number of mortality caused a hypertension in 2016 ie 513 patients, this number increased in 2017 to 637 patients. Based on the above facts researchers interested in conducting a study "Effectiveness of Drugs Therapy of Hypertensive patients In Undata General Hospital Palu In 2016-2017".

Methods

This is a quantitative study; data were collected retrospectively by looking at medical records of hypertensive patients were hospitalized in Undata General Hospital in 2016-2017. This type of research is done by the data retrieval a mild, moderate and severe of hypertension then see the

effectiveness of the therapy through pre and post blood pressure profile based on the use of antihypertension drugs, therapy accuracy and dose adjusted to JNC VII. The samples in this study were hypertensive patients in Undata General Hospital who meet the inclusion and exclusion criteria, where the inclusion criteria is adult patients aged > 18 years, patients who are diagnosed with mild, moderate and severe hypertension and getting antihypertension therapy, hypertensive patients with or without complications and patients hospitalized in Undata General Hospital in 2016-2017.

The exclusion criteria is that patients who have a medical record is incomplete, patients who did not complete the treatment and the patient died after receiving treatment. Data were analyzed with univariate as patient characteristics and bivariate analysis as an analysis of the relationship between independent variables and the dependent variable with a statistical *Paired t-test* to see the differences in changes in blood pressure reduction.

Result

The distribution of demographic data of hypertensive patients receiving antihypertension therapy in hospitalized Undata General Hospital Palu in 2016-2017 based gender, age and diagnosis of patients can be seen in the Table I.

Table 1: Demographic Data of Hypertensive Patients Who Received Treatment in Undata General Hospital Palu in 2016-2017

Data	Amount (n =63)	Percentage (%)
Gender		
Man	29	46,0
Woman	34	53,9
Ages		
<50 Years	27	42,9
51-70 Years	31	49,2
>71 Years	5	7,9
Hypertion Diagnosed		
Mild hypertension	22	34,9
Moderate hypertension	16	25,4
Severe hypertension	25	39,7

The number of complications and comorbidities most hypertensive patients receiving antihypertensive therapy

hospitalized Undata General hospital Palu in 2016-2017 can be seen in the Table II.

Table 2: Complications and Comorbidities of Hypertensive Patients Who Receive Therapy in Undata General Hospital Palu in 2016-2017

Complications	Number of patients who have complications (n = 36)	Percentage (%)
SNH	11	30,5
Vertigo	8	22,2
LBP	4	11,1
Cephalgia	4	11,1
Angina pectoris + vertigo	3	8,3
Angina pectoris	3	8,3

CKD	2	5,5
Vertigo + SNH	2	5,5
CHF	1	2,8
Epitaxis	1	2,8
Angina pectoris + hiperlipidemia	1	2,8
CKD + cephalgia	1	2,8
LBP + nefrolithiasis	1	2,8
SNH + hemiparesis sinistra	1	2,8
Fatty liver	1	2,8
Vertigo + LBP	1	2,8
Efusi pleura + acietas	1	2,8
Atypical eyes bris	1	2,8

Ket: SNH: Stroke Non-hemorrhagic

CKD: Chronic kidney disease

CHF: Congestive heart failure

LBP: Low back pain

The accuracy of the selection and dosage of antihypertensive therapy in hypertensive patients in Undata General Hospital Palu in 2016-2017 can be seen in the Table III:

Table 3: The Accuracy of Antihypertensive Drug Selection and Dosage to Patients Who Receive Treatment in Undata General Hospital Palu in 2016-2017

Accuracy of drug selection				
Diagnosys	Appropriate drug selection (n = 63)	Percentage (%)	Unappropriate drug selection (n = 63)	Percentage (%)
Mild	22	26,9	0	7,9
Moderate	16	25,4	0	0
Severe	25	28,6	0	11,1
Accuracy of dose selection				
Drugs clasification	Appropriate dose	Percentage (%)	Unappropriate dose	Percentage (%)
ACEi	3	4,7	0	0
Drug class	Appropriate dose	Percentage (%)	Unappropriate dose	Percentage (%)
CCB	27	42,9	0	0
Combination of Drugs				
ACEi + CCB	11	17,4	0	0
ARB + CCB	5	7,9	0	0
ACEi + β - Blocker	2	3,1	0	0
Diuretics Thiazid + CCB	4	6,3	0	0
ACEi+ CCB + β - Blocker	1	1,6	0	0
Diuretics Thiazid + ACEi + CCB	3	4,8	0	0
ARB + CCB + Diuretics loop	1	1,6	0	0
ACEi + CCB + Diuretics loop	1	1,6	0	0
CCB + Diuretics loop	1	1,6	0	0
ACEi + β - Blocker + Diuretics loop	3	4,8	0	0
CCB + ARB + β - Blocker	1	1,6	0	0
Total	63	93,7	0	0

Ket: ACEi: Angiotensin converting enzim Inhibitor

CCB: Calsium channel blocker

ARB: Angiotensin receptor blocker

HCT: Hydrochlorothiazides

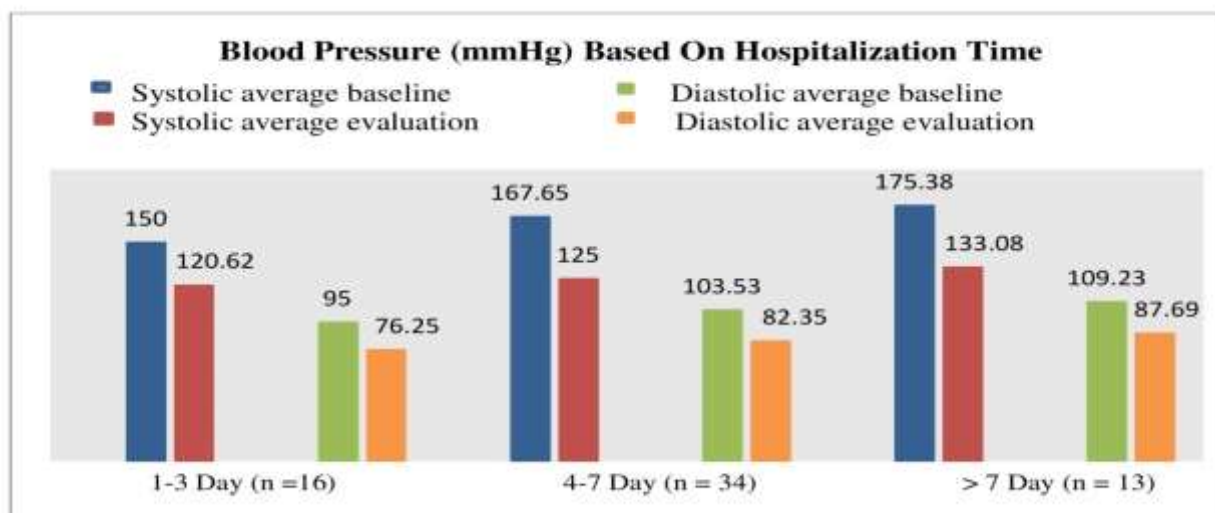
Decreased blood pressure of hypertensive patients to achieve blood pressure targets in Undata General Hospital Palu in 2016-2017 can be seen in the Table IV:

Table 4: Decreased Blood Pressure of Hypertensive Patients Achieve

Blood Pressure Targets				
Diagnosis of hypertension	Achieved (n=63)	Percentage (%)	Not achieved (n=63)	Percentage (%)
Mild	22	34,9		0
Moderate	16	25,4	0	0
Severe	25	39,6	0	0

The decreased values of blood pressure in hypertensive patients based on the patient

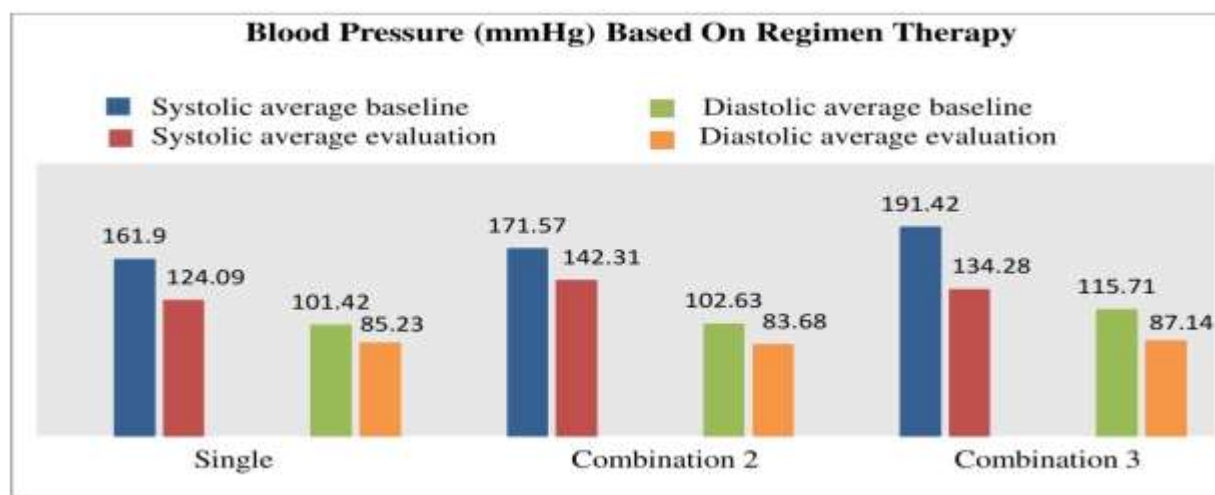
length of stay in hospitalized at Undata General Hospital Palu in 2016-2017 can be seen in the Graph 1.



Graph 1: the reduction value of blood pressure in hypertensive patients based on the patient length of stay in hospitalized at Undata General Hospital Palu

The decreased value of blood pressure in hypertensive patients by treatment regimen

in Undata General Palu in 2016-2017 can be seen in the graph 2:



Graph 2: the decrease value of blood pressure in hypertensive patients based treatment regimen in hospitalized at Undata General Hospital Palu

Discussion

Results of research conducted in Undata General Hospital Palu over a period of 2 months (November-December 2018) obtained the number of patients were 63 who meet the inclusion and exclusion criteria. In Table 1 of the hypertensive patient demographics indicate that patients with hypertension is dominant female as many as 34 patients (53.9%) of 63 patients receiving antihypertensive therapy, this is according to research Novian [7], which showed the prevalence of woman who suffer from hypertension higher at 58.3% compared to 41.7% man. The high prevalence of hypertension in women often occurs after

experiencing menopause due to the cessation of production of endogenous estrogen causes the body can not maintain vasodilation which can control blood pressure [8]. Most women experience symptoms of menopause in their 40s and reached its peak at the age of 50 years [9]. The results stratified by age group showed that the age group of hypertensive patients is the most dominant is 51-70 years as many as 31 patients.

The high number of patients in the 51-70 years due to structural and functional changes in the peripheral vascular system that is responsible for changes in blood pressure in the elderly. These changes include atherosclerosis, loss of elasticity of

the connective tissue, and a decrease in vascular smooth muscle relaxation, which in turn lowers the ability of distension and tensile strength of blood vessels. Consequently, the aorta and large arteries decrease its ability to accommodate the volume of blood pumped by the heart (stroke volume), resulting in decreased cardiac output and increased peripheral resistance [10].

This results in line with study conducted by Sigalingging [11], that the age group that many hypertensive is 51-70 years of 60 people (75%), <50 years 15 people (18.75%) and > 71 years 5 people (6, 25%). The results based on the diagnosis of patients found the number of patients with severe hypertension more than the number of mild and moderate hypertensive patients with approximately 25 patients (39.7%).

This is because almost of patients with severe hypertension had a complications that most non-hemorrhagic stroke and the number of elderly patients are more dominant in severe hypertension. According Darmojo [12], factors affecting hypertension in the elderly, is a decrease renin levels because of the declining number of nephrons due to the aging process, increased sensitivity to sodium intake, decreased elasticity of peripheral blood vessels due to the aging process will increase the peripheral vascular resistance resulting in systolic hypertension and atheromatous changes due to the aging process causes endothelial dysfunction which can lead to the formation of various cytokines and other chemical substances which then led to resorb sodium in the kidney tubules, increasing the peripheral vascular sclerosis and other conditions associated with elevated blood pressure.

The results of a similar study conducted by Syavardie [13], which 49 patients (53.8%) had severe hypertension, 28 patients (30.8%) had moderate hypertension and 14 patients (15.4%) had mild hypertension and one effect the high prevalence of hypertension is the level of stress on the patient. In Table 2 the complications and comorbidities of patients with hypertension in Undata General Hospital Palu showed the highest complication is SNH (non-hemorrhagic stroke) with 11 patients (30.5%), Vertigo with

8 patients (22.2%), LBP and cephalgia each of the 4 patients (11.1%).

This is consistent with the literature Sawicka, et al [14] which states complications of the disease that is often experienced by patients with hypertension is ischemic stroke (SNH), myocardial infarction (MI), left ventricular hypertrophy, heart failure (CHF), aneurysms and kidney chronic failure (nephropathy hypertension) and hypertension retinopathy. Based on Usrin [15], that of the 194 people who suffer from hypertension as many as 137 people (70.6%) had an ischemic stroke (SNH), and 50 people who are not hypertension were 9 people (18.0%) experienced an ischemic stroke (SNH) so that hypertension can significantly affect the incidence of ischemic stroke and as a risk factor for ischemic stroke, the risk of ischemic stroke in patients with hypertension is 11 times greater than those without it.

Table 3 on the accuracy of antihypertension drug selection and dosage in hypertensive patients showed that patients diagnosed with mild hypertension proper selection of drugs as many as 22 patients (34.9%), patients diagnosed with moderate hypertension being the proper selection of drugs as many as 16 patients (25, 4%) and patients diagnosed with severe hypertension proper selection of drugs as many as 25 patients (39.6%).

According to JNC VII [6], in the treatment algorithm of patients with hypertension, the early stages of hypertension therapy degree 2 by administering a combination of drugs. Combination therapy can lower blood pressure greater with minimal side effects. The combination of antihypertensive drugs ideally using diuretics, the thiazid diuretics that can be combined with the group of ACEI, ARB, beta-blocker or CCB.

Most patients with hypertension will require two or more antihypertension drugs to achieve their blood pressure target; the addition of a second drug from a different class should be initiated when the use of a single drug in adequate doses fails to achieve the target. When the blood pressure > 20 mm Hg from systolic blood pressure target or 10 mmHg from diastolic blood pressure targets, should consider two-drug therapy, either as separate prescriptions or in fixed-dose combinations. Initiation of therapy with more

than one drug can increase the likelihood of achieving blood pressure targets more quickly. The use of multidrug combinations often produce greater reductions in blood pressure with minimal doses, resulting in fewer side effects [6].

The use of monotherapy antihypertension drugs given to patients with hypertension who are not accompanied by complications and it is advisable to arrange a healthy lifestyle. Meanwhile, given the combination therapy for patients with hypertension accompanied by complications such as cardiovascular disease, diabetes mellitus, and heart failure [16].

The results also showed that the dose received by all patients with hypertension better use of mono antihypertension drugs or combination in accordance with the standards of JNC VII, but there are 4 patients received minimal doses of antihypertension lisinopril is 5 mg/day without diuretics, whereas the usual dose lisinopril in hypertensive patients ie 10-40 mg/day or 5 mg/day in combination with a diuretic [6].

Minimal dose can be given when hypertensive patients achieve blood pressure targets so that all 4 patients revealed precise dose. Precise dose is conformity dosage of antihypertension drugs with therapeutic dose range, in terms of usage per day with a dose based on the patient's specific condition. It was said a dose of less than or the dose is too low is that if the dose received by the patient under a range of therapeutic doses that should be acceptable to the patient, doses that are too low can cause drug levels in the blood is below the range of therapies that can not provide the expected response that is the outcome of therapy in the form of a pressure blood decreased is not reached.

Conversely, a high drug doses levels in the blood exceeds the range of therapies induce a state of emergence of the major side effects of antihypertension are hypotension and other possible effects of toxicity [17]. Table 4 about decreases in blood pressure in hypertensive patients achieve blood pressure targets showed that patients with mild, moderate and severe hypertension who achieve blood pressure target respectively ie 22 patients (34.9 %), 16 patients (25.4 %) and 25 patients (39.6 %).

Generally, patients with hypertension in Undata General Hospital achieve blood pressure targets, which targets the blood pressure of hypertensive patients is the value of systolic blood pressure and diastolic less than the previous value and destination value of blood pressure in hypertensive patients according to the JNC VIII that patients with age <60 years is <140/90 mmHg and patients with age > 60 years is <150/90 mmHg.

The results of a similar study conducted by Ratnasari [18] showed that there were 48 patients (41%) who have hypertension do not achieved the target of control. But the majorities, ie 69 patients (59%) of all respondents' survey have hypertension under control. Graph 1 about a decrease in blood pressure in hypertensive patients hospitalized with paired t-test showed a significant decrease in blood pressure value ($p = <0.05$) in patients hospitalized for 1-3 days, 4-7 days and > 7 days.

The average differences in reduction of systolic and diastolic blood pressure is the most significant occurs in patients with hospitalized 4-7 days, > 7 days and 1-3 days respectively ie 42.64/21.17 mmHg, 42.30/21.53 mmHg and 29.37 / 18.75 mmHg. According to research Rahmawati [19] that the average of patients hospitalized was treated hypertension is more than 3 days. Graph 2 about the average value of blood pressure in hypertensive patients by treatment regimen in Undata General Hospital Palu with paired t-test showed a significant decrease in blood pressure in hypertensive patients after using monotherapy, combination therapy of the two and triple drug therapy.

The regimen with the value ($p = <0.05$) and the average blood pressure than mono therapy use dropped diastolic and systolic of 37.80 mmHg/16.19 mmHg, then therapy with a combination of two dropped systolic and diastolic of mmHg 29.26/18.94 mmHg and triple drug therapy dropped systolic and diastolic of 57.14 mmHg/28.57 mmHg.

Based on paired t-test was significantly differences in blood pressure reduction than monotherapy, the combination of the two and three drugs therapy with significant values of <0.05. In this study obtained combination of

three-drug therapy is more effective in reducing blood pressure in hypertensive patients aimed value of an average reduction blood pressure in systolic of 57.14 mm Hg and diastolic of 28.57 mmHg. This is according to research Udayani [20], which states that there are differences in the effectiveness of blood pressure in hypertensive patients treated with a single amlodipine and combination therapy of amlodipine with lisinopril.

In this case the combination therapy of amlodipine and lisinopril is more effective in lowering the blood pressure of hypertensive patients seen from the average reduction in systolic blood pressure were given combination therapy of 9.96 mmHg and diastolic blood pressure with a combination therapy of 5.91 mmHg, compared with a decrease in systolic blood pressure with monotherapy of 8.01 mmHg and diastolic blood pressure of 4.73 mmHg.

Treatment with more than one drug will increase the likelihood of achieving blood pressure target more quickly. Use of the drug combination often results in a decrease in blood pressure were greater in lower doses than when the drug is used singly [16].

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Conclusion

The research concluded as follows:

- Accuracy and dose therapy in hypertensive patients by JNC VII guidelines indicate that patients diagnosed with mild, moderate, and severe hypertension overall proper drug selection and dose received by patients with hypertension better overall use of mono antihypertension drugs or combination in accordance with the standards of JNC VII.
- Paired t-test of hypertensive patients with mono drug treatment blood pressure decreased 37.80/16.19 mmHg ($p = <0.05$), patients administering two drug combinations blood pressure decreased 29.26/18.94 mmHg ($p = <0.05$) and patients administering three drug combination blood pressure decreased 57.14/28.57 mmHg ($p = <0.05$).

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