

Comparison of the effectiveness of using captopril and valsartan in hypertension patients with kidney failure at Citra Husada hospital

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Article Info	ABSTRACT
<p>Keywords: Chronic kidney failure, Captopril, Valsartan</p>	<p>Renal failure was a clinical condition characterized by irreversible decline in kidney function. Renal failure was divided into chronic and acute renal failure. Hypertension was a major factor triggering the occurrence of kidney disease and kidney failure. Data released by WHO shows that 50% of people with kidney failure, both acute and chronic, reach 50%. Based on Riskesdas, in 2018 the prevalence of chronic kidney failure in Indonesia was 0.38%. East Java Province was 0.3%, while the highest prevalence based on age was 65-74 years old at 8.23%. Effectiveness could provide information about how much a drug could achieve the desired effect in clinical practice. The purpose of this study was to compare the effectiveness of used captopril and valsartan in hypertensive patients with kidney failure at hospital. Methods: This research uses a numerical comparative analytical research type with an observational and cross-sectional design. The research was conducted at Citra Husada Hospital in March-April 2023, using patient medical record data sources, and a sample of 64 patients. Data sources were analyzed using the Chi square test. Data is displayed in frequency and percentage form. Results: The results of this study showed that the average valued of blood pressure before administration of captopril was 183. 65 mmhg/99. The average value of blood pressure after administration of captopril was 171. 00 mmhg/91. 778 mmhg. The average value of blood pressure before administration of valsartan was 165. 87 mmhg/92. 81 mmhg. The average value of blood pressure after administration of valsartan was 151. 15 mmhg / 81. 09 mmhg. From the results of the studies, it was found that there was no difference between the comparison of the effectiveness of used captopril and valsartan in hypertensive patients with kidney failure at hospital. Conclusion: The conclusion of this study shows that there was no comparison of the effectiveness of used captopril and valsartan in hypertensive patients with kidney failure, both of which had the same effectiveness in lowering blood pressure</p>
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INTRODUCTION

Kidney failure is the inability of the kidneys to filter the body's metabolic waste and maintain the balance of electrolyte fluids such as potassium and sodium in the blood due

to decreased kidney function. Kidney failure is a clinical condition characterized by an irreversible decrease in kidney function. Kidney failure is divided into chronic kidney failure and acute kidney failure (Suparyanto dan Rosad, 2020).

Hypertension is the main factor that triggers kidney disease and kidney failure. The condition of kidney failure with the etiology of hypertension occurs due to narrowing or blockage of blood vessels in the arterial area, so that blood flow to the kidneys is inefficient and causes the kidneys to not function properly. Hypertension is the main factor that triggers kidney disease and kidney failure. The condition of kidney failure with the etiology of hypertension occurs due to narrowing or blockage of blood vessels in the arterial area, so that blood flow to the kidneys is inefficient and causes the kidneys to not function properly. . The mechanism of kidney damage caused by hypertension is caused by thickening of the tunica intima cells in the glomerulus of the kidney. This causes a further increase in blood pressure resulting in permanent kidney damage (*Vania L Dkk, 2019, n.d.*)

In kidney failure patients, the therapy that can be done is maintaining body pressure, lifestyle changes, medication, fluid and food intake and hemodialysis. And in hypertensive patients with kidney failure, the therapy that can be done is pharmacological and non-pharmacological therapy, in non- pharmacological therapy, the thing that can be done is living a healthy lifestyle, and in pharmacological therapy, the thing that can be done is administering antihypertensive drugs for kidney failure in groups. ARB (Angiotensin 2 Receptor Blocker) and ACE Inhibitor (Angiotensin-converting enzyme Inhibitor) (JNC-8, 2014).

METHOD

This research uses a numerical comparative analytical research type with an observational and design *cross-sectional*, the research was conducted at Citra Husada Hospital in March-April 2023, using patient medical record data sources, and a sample of 64 patients. The population of this study used were hypertensive patients with kidney failure who were included in the inclusion criteria, namely 64 patients who were treated in hospitals on an outpatient basis in Jember district for the period 2022. The sample size in this study was 64 using the sampling technique used, namely the total technique. *sampling*. Total *sampling* is a sampling technique where the number of samples is the same as the population. The inclusion criteria specified in the study are as follows:

1. All genders diagnosed with hypertension with kidney failure or other comorbidities.
2. Aged 18 years to 80 years, gender diagnosed with hypertension with kidney failure in prehypertension, stage 1 hypertension and stage 2 hypertension.
3. Patients who received single antihypertensive treatment (Valsartan or Captopril) in the period 2022.

Data from hypertensive patients with kidney failure in hospital outpatient settings, then analyzed to determine changes in blood pressure before and after being given the drug valsartan to patients with hypertension and kidney failure, then processed using IBM SPSS 25. The analysis used was univariate and bivariate analysis. Univariate analysis is

an analysis that aims to determine the results of data collection in the form of a frequency distribution table, while bivariate analysis in this study uses the *Chi Square*.

RESULTS AND DISCUSSION

Data obtained from research conducted during the trial shows that the number of patients suffering from hypertension with kidney failure who use the drug valsartan for the 2022 period is 64 patients. In this study, sampling used total techniques *sampling*. Total *sampling* is a sampling technique where the number of samples is the same as the population. Data collection was carried out according to hospital procedures. Collecting data in the form of patient blood pressure before and after being given the single drug captopril or valsartan which is used in hypertensive patients with kidney failure, these drugs have their own characteristics. Apart from that, the drugs captopril or valsartan obtained in this study included general data and special data. General data usually includes patient type and patient age. Patient characteristics based on age and sex can be seen in the table below.

Table 1. Percentage of Hypertensive Patients with Kidney Failure Based on Gender

Gender	Frequency (n)	Percentage (%)
Male	23	35,9
Female	41	64,1
Total	64	100

Based on table 1, it shows that the distribution of characteristics based on gender in hypertensive patients with kidney failure mostly occurs in women, namely 41 patients (64.1%). According to the Ministry of Health in 2019, men have a 2.3 times greater risk of experiencing increased blood pressure than women, but after entering menopause the prevalence of high blood pressure in women increases, after the age of 65 years the incidence of high blood pressure in women is higher than in women caused by factors hormonal. Sometimes hormones during menopause have a bad impact on increasing blood pressure, such as increasing relative androgen levels, activation of the renin-angiotensin system, increasing endothelial plasma levels, and increasing insulin resistance. Steroid hormones in women have effects that regulate the renin-angiotensin system and influence angiotensinogen production and sodium metabolism. A decrease in estrogen levels during menopause results in upregulation of the renin-angiotensin system and an increase in plasma renin. These various physiological changes can cause hypertension in menopausal women (Baroroh dkk., 2021)

Table 2. Percentage of Hypertensive Patients with Kidney Failure Based on Age

A	Frequency(n)	Percentage (%)
20-39 years	1	18
40-50 years	1	21
51-60 years	2	34
61-80 years	1	25
Tot	6	1

Based on table 2, it shows that the distribution of characteristics based on age in hypertensive patients with kidney failure is mostly found in those aged 51-60 years with 22 patients (34.4%).

According to the Ministry of Health in 2017, age is a factor causing kidney failure, this is caused by unhealthy lifestyles such as consuming lots of fast food, sitting all day in the office, often drinking coffee, and rarely drinking water. These bad habits are a risk factor for kidney damage. According to the Ministry of Health, as we age, blood vessels gradually lose their elasticity, which can contribute to increased blood pressure.

Table 3. Blood pressure data before administering captopril to hypertensive patients with kidney failure at Citra Husada Hospital

Blood Pressure	N	Mean	Std. Deviations
Sistolik	32	183,65 mmHg	24,32
Diastolik	32	99,31 mmHg	15,83

Based on table 3, it shows that the average systolic and diastolic blood pressure before administering the drug captopril in hypertensive patients with kidney failure was 183.65 mmHg and 99.31 mmHg.

High blood pressure is actually triggered by several factors, namely heredity, age, consuming salt, cholesterol, obesity, stress, smoking, consuming alcohol, lack of exercise, and gender. In this study, 38 patients were over 51 years old (59.4%), 14 patients (21.9%) were over 40-50 years old, and 12 patients (18.8%) were 20-39 years old (can be seen in table 5.2). According to the Ministry of Health in 2017, age is a factor causing kidney failure, This is caused by unhealthy lifestyles such as consuming lots of fast food, sitting all day in the office, often drinking coffee, rarely drinking water. These bad habits are a risk factor for kidney damage.

Table 4. Blood pressure data after administering the drug captopril to hypertensive patients with kidney failure at Citra Husada Hospital

Blood Pressure	N	Mean	Std. Deviations
Sistolik	32	169,53 mmHg	21,99
Diastolik	32	91,778 mmHg	15,76

Based on table 4 , it shows that the average systolic and diastolic blood pressure after administering the drug captopril in hypertensive patients with kidney failure is 171.00 mmHg and 91.778 mmHg.

The pharmacological therapy given is using the antihypertensive drug captopril, because by administering the drug captopril to hypertensive patients with kidney failure with high blood pressure it can reduce blood pressure, and this is one of the therapies that can be given to hypertensive patients with kidney failure. In this study, patients received the drug captopril at a dose of 25 mg. Captopril is an ACE inhibitor antihypertensive

whose mechanism of action is to prevent the conversion of angiotensin I to angiotensin II (Mayasari, 2020).

Table 5. Blood pressure data before administering valsartan to hypertensive patients with kidney failure at Citra Husada Hospital

Blood Pressure	N	Mean	Std. Deviations
Sistolik	32	165,87 mmHg	27,08
Diastolik	32	92,81 mmHg	20,26

Based on table 5.6, it shows that the average systolic and diastolic blood pressure before administering the drug valsartan in hypertensive patients with kidney failure was 165.87 mmHg and 92.81 mmHg.

The factors that trigger high blood pressure are heredity, age, cholesterol, obesity, stress, smoking, lack of exercise and gender. General patient data based on gender showed that the percentage of patients obtained was 41 patients (64.1%) female and 23 male patients (35.9%). According to the Ministry of Health in 2019, men have a 2.3 times greater risk of experiencing increased blood pressure than women, but after entering menopause the prevalence of high blood pressure in women increases, after the age of 65 years the incidence of high blood pressure in women is higher than in women caused by factors hormonal. Sometimes some hormones during menopause have a bad impact on increasing blood pressure such as an increase in relative androgen levels, activation of the system *renin-angiotensin*, increased endothelial plasma levels, increased insulin resistance. Steroid hormones in women have effects that regulate the renin-angiotensin system and influence production *angiotensinogen* and sodium metabolism. A decrease in estrogen levels during menopause results in increased regulation of the system *renin-angiotensin* and increased plasma renin. These various physiological changes can cause hypertension in menopausal women (Baroroh et al., 2021)

Table 6. Blood pressure data after administering the drug valsartan to hypertensive patients with kidney failure at Citra Husada Hospital

Blood Pressure	N	Mean	Std. Deviations
Sistolik	32	151,15 mmHg	26,06
Diastolik	32	81,09 mmHg	18,8

Based on table 6, it shows that the average systolic and diastolic blood pressure after administering the drug valsartan to hypertensive patients with kidney failure is 151.15 mmHg and 81.09 mmHg. In hypertensive patients with kidney failure, antihypertensive pharmacological therapy is given with the ARB (Angiotensin 2 Receptor Blocker) group, one of which is valsartan. In this study, one of the drugs used was valsartan at doses of 160 mg and 80 mg. Valsartan is a drug whose mechanism of action affects the renin-angiotensin-aldosterone system (RAAS) (Drugbank, 2022).

Table 7.Comparative Analysis Test of the Effectiveness of Using the Drugs Captopril and Valsartan

	value	df	Asymptotic Significance (2-sided)
Person Chi-square	,000 ^a	1	1,000

Based on table 7, the p value is 1.000, which means p value $> \alpha = 0.05$, which means H_1 is rejected and H_0 is accepted, meaning there is no difference between the effectiveness of using the drugs captopril and valsartan in hypertensive patients with kidney failure at Citra Husada Hospital. . The results of the data analysis that can be concluded are that the two drugs are equally effective and there is no difference in reducing blood pressure in hypertensive patients with kidney failure at Citra Husada Hospital.

This research shows that the reduction in blood pressure resulting from each single drug decreases blood pressure. The factors that make the two drugs equally effective may be due to the patient regularly and correctly taking the medication, maintaining a diet, exercising regularly, consuming less salt, not smoking and maintaining a healthy lifestyle. Each drug has a different mechanism of action, in the ACE inhibitor class of captopril the mechanism of action is to prevent the conversion of angiotensin I to angiotensin II, and the pharmacokinetics of the drug captopril has an oral bioavailability of around 70%. Captopril must be consumed on an empty stomach, one hour before eating or two hours after eating because if there is food it will cause a decrease in drug absorption, so it must be consumed on an empty stomach, captopril can also be consumed before sleeping because it causes dizziness. Captopril has a half-life of 2-3 hours, and the pharmacodynamics of captopril are ACE inhibitors.

ACE inhibitors inhibit the rapid conversion of ATI to ATII and antagonize the induced increase in blood pressure. Meanwhile, for valsartan drugs in the ARB group, the mechanism of action is that it affects the renin-angiotensin-aldosterone system (RAAS), and the pharmacokinetics of the oral bioavailability of valsartan is around 23-25% after oral dosing. Valsartan has an elimination half-life of approximately 6 hours. Valsartan is taken before or after meals, twice a day, given in an initial dose of 80 mg once a day for high blood pressure. If necessary, this dose can be increased to 160-320 mg once a day, valsartan is given orally, the blood pressure lowering effect occurs within 2 hours, reaches a peak within 4 to 6 hours, and remains for more than 24 hours (Drugbank, 2022). Providing antihypertensive therapy with captopril and valsartan to hypertensive patients with kidney failure has been effective, with a marked reduction in blood pressure in hypertensive patients with kidney failure at Citra Husada Hospital.

CONCLUSION

The research results, there was no difference between the comparison of the effectiveness of using the drugs captopril and valsartan in hypertensive patients with kidney failure at Citra Husada Hospital.

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