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Changes in blood pressure in hypertension patients with kidney failure on drug valsartan administration in hospital

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ABSTRACT
Hypertension an increase in blood pressure, including systolic and diastolic blood pressure into two types, namely essential hypertension, the most common being essential and secondary hypertension. The prevalence of hypertension in Indonesia using measurement methods in samples aged ≥18 years 34.1%, while the prevalence of hypertension cases in East Java province 36.3%. In pharmacological therapy the administration of drugs includes thiazide diuretics, adrenergic blockers, Angiotensin Converting Enzyme Inhibitors (ACE-inhibitors), angiotensin - II - blockers, in non-pharmacological therapy, namely changes in diet and lifestyle by consuming balanced foods according to needs, avoiding saturated fat, maintaining body weight, limiting salt consumption, the aim of knowing changes in blood pressure in hypertensive patients with kidney failure when administering the drug valsartan at Hospital Citra Husada. This research used a numerical comparative analytical research type with a retrospective design, the research was conducted in March, April 2023 at Citra Husada Hospital, the source of research data was from medical records. The sample obtained was 32 hypertensive patients with kidney failure who met the inclusion criteria, namely all genders aged 18 years and over, and outpatients at Hospital on a single drug (valsartan). Sampling used a total sampling technique, using Wilcoxon test data analysis to analyze changes in blood pressure. The average value of systolic blood pressure before administering the drug valsartan was 165.87 mmHg with a standard deviation of 27.06. The average systolic value after administering the drug valsartan was 151.15 mmHg with a standard deviation of 26.06, with a difference value of 14.72 mmHg. The average value of diastolic blood pressure before administering the drug valsartan was found to be 92.81 mmHg with a standard deviation of 20.16. The average diastolic value after administering the drug valsartan was found to be 81.09 mmHg with a standard deviation of 18.8, with a difference value of 11.72 mmHg. Conclusion: There are marked changes in blood pressure after administering the drug valsartan, valsartan can be recommended as an antihypertensive with kidney failure according to the inclusion criteria in the study.

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INTRODUCTION

Hypertension is also known as the *silent killer*, hypertension progresses slowly and does not show any symptoms for years, the disease can progress to the point where it can damage blood vessels and other organs. (Price and Wilson, 2014). Hypertension is not contagious but is a cardiovascular disease that can continue in adulthood, then high systolic blood pressure from 140 mmHg to 90 mmHg (1 millimeter of mercury) is called diastolic, two measurements with an interval of 5-10 minutes in a calm and resting state and Many people are not aware that it is the cause of hypertension in adults and the elderly (Ministry of Health, 2014).

World health data according to *World Health Organization* (WHO) in 2015 there were around 1.13 billion people in the world with hypertension, 1 in 3 people diagnosed with hypertension, the number of people with hypertension continues to increase every year and it is estimated that 1.5 billion people will suffer from hypertension, and it is estimated that 10.44 million people per year die due to hypertension and its complications ((Bar, 2022), Indonesian Ministry of Health, 2020). The prevalence of hypertension in Indonesia using measurement methods in samples aged ≥18 years is 34.1%, while the prevalence of hypertension cases in East Java province is 36.3%. This shows that the incidence of hypertension in East Java exceeds the national average (Ministry of Health of the Republic of Indonesia, 2018). This shows that the prevalence of chronic kidney failure cases in East Java is still quite high (Ministry of Health of the Republic of Indonesia, 2018).

Kidney failure is a condition where kidney function suddenly decreases. Kidney failure occurs when the kidneys are unable to transport the body's metabolic waste or perform their regular functions. A substance that is normally eliminated in urine accumulates in body fluids due to impaired renal excretion and causes disruption of endocrine and metabolic functions, fluids, electrolytes and acid bases (Mustofa et al., 2022). Chronic renal failure is a progressive disorder of renal function in which the body's ability fails to maintain metabolism and fluid and electrolyte balance, resulting in uremia (Ministry of Health, 2017).

There are two etiologies based on the causes of hypertension, namely primary hypertension or essential hypertension where the cause is unknown (idiopathic), and is also often associated with unhealthy factors and primary hypertension is the most common, around 90% of hypertension incidents (Yanita, 2017). Secondary hypertension or non-essential hypertension caused by kidney disease, hormonal disorders, or use of certain medications (Yunita, 2017).

The pathophysiology of kidney disease initially depends on the underlying disease, but in subsequent development the process that occurs is more or less the same, a reduction in kidney mass resulting in structural and functional hypertrophy of the remaining nephrons (surviving nephrons) as a compensatory effort, mediated by vasoactive molecules such as cytokines growth factor. This results in hyperfiltration, which is followed by an increase in capillary pressure and blood flow glomerulus. Functional impairment glomerular can cause hypertension and conversely hypertension can cause functional

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disorders glomeruli, kidney function will decline progressively and end up as chronic kidney disease (Arini et al., 2020)

Pharmaceutical service standards are benchmarks used as guidelines for pharmaceutical personnel in providing pharmaceutical services (Meina & Maryati, 2021). Pharmaceutical service standards in hospitals are two important things, namely the management of pharmaceutical preparations, medical devices and consumable medical materials, as well as clinical pharmacy services (Minister of Health Regulation No. 72 of 2016). Clinical pharmacy services are not running well and the quality of pharmaceutical services requires a change in service from the old one on medicinal products to a new paradigm that is patient-oriented (Novaryatiin et al, 2018). In this research, the role of pharmacy is needed to improve the quality of life of hypertensive patients with kidney failure, namely by monitoring antihypertensive therapy.

So that high blood pressure can be treated from the start or if it recurs, take preventive measures and reduce the occurrence of complications. To maintain and maintain body weight, and reduce foods that contain fat which will cause cholesterol, and reduce the intake of solid food salts which can cause hypertension, diet high in fiber, eat more fruit and vegetables to prevent recurrence of hypertension. It is best for hypertensive patients to live healthily to reduce the risk of hypertension complications (Anshari, 2020). Uncontrolled hypertension can cause kidney problems characterized by proteinuria. Proteinuria is a condition that shows the amount of protein in the urine increases above normal. Proteinuria is an important indicator of the development of kidney disease (Eko, 2020)

METHOD

In This research uses a numerical comparative analytical research type with design retrospective. Retrospective is a type of research that requires measurement or time observasional and data collection. The population of this study used were hypertensive patients with kidney failure who were included in the inclusion criteria, namely 32 patients who were treated in hospital on an outpatient basis in Jember Regency for the period 2022. The sample size in this study was 32 using the sampling technique used, namely the total 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 patients diagnosed with hypertension with kidney failure were treated as single drug outpatients (valsartan) in the 2022 research period, March-April 2023, outpatients at Jember Hospital.
2) All genders and ages above 18 years to 70 years of age, patients diagnosed with hypertension failed prehypertension, stage 1 hypertension, and stage 2 hypertension.

The data used is secondary data, namely data obtained from medical records of 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 is univariate and bivariate analysis. Univariate analysis is an analysis that

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aims to determine the results of data collection in the form of a frequency distribution table, while bivariate analysis in this study uses the *Wilcoxon Signed Ranks Test*. In this research, we first look at the measurement scale, namely Intervals in the form of comparative hypotheses.

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 32 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 drug valsartan which is used in hypertensive patients with kidney failure, this drug has its own characteristics. Apart from that, the valsartan drug obtained in this study included general data and special data. General data usually includes patient type and patient age

Gender is also a factor that influences blood pressure. By
It is generally assumed that hypertension usually affects men, and in women greater anti-inflammatory properties (Muhammad Yunus et al., 2021).

Table 1. Frequency distribution of patients based on gender at Jember Hospital for the 2022 period.

Gender	Frequency (n)	*Present* %
Man	18	56,3 %
Woman	14	43,8 %
Total	32	100,0

Based on table 1, it shows that the distribution of characteristics based on gender in hospitals for the 2022 period is that the majority are male, namely 18 patients with presentasi (56,3%). research conducted by Irza (2009), Dharma (2015) and Aryatiningsih (2018), which states that the incidence of hypertension is related to gender. According to these three studies, men are more likely to be at risk of experiencing increased blood pressure because men do not have hormones like those found in women, such as the hormone estrogen, so men do not have protection against hypertension and its complications. The hormone estrogen itself is obtained by women during menstruation every month and is continuously renewed. However, if a woman experiences menopause, the hormone estrogen will decrease and the risk of hypertension will increase (Arum, 2019).

Age is one of the factors that influences blood pressure. The older a person is, the greater the risk that a person will develop hypertension (Muhammad Yunus et al., 2021)

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Table 2. Frequency distribution of patients by age at Jember Hospital for the 2022 period.

Age (Years)	Frequency (n)	*Present* %
20-39	9	28,1 %
40-50	2	6,3 %
51-60	10	31,3 %
61-70	11	34,4 %
Total	32	100,0

Based on table 2, which shows the distribution of characteristics based on age at Jember Hospital for the 2022 period and the majority are aged 61-70 years, 11 patients with presentasi (34,4 %). Researchers say that as people get older, the risk of experiencing hypertension with kidney failure is very large, many people who experience hypertension are better off when they are 40 years old. This is because at ages above the beginning of old age, people experience or suffer from degenerative diseases, one of which is hypertension, kidney and heart failure. Systolic blood pressure is the maximum pressure generated in the arteries when blood enters the blood vessels with an average of 120 mmHg (Zunnur, 2019).

Table 3. Data on systolic blood pressure before administering the drug valsartan to hypertensive patients with kidney failure at Jember Hospital in the 2022 period.

Respondent	Systolic Blood Pressure
N	32
Mean	165,87 mmHg
Median	170,00 mmHg
Std.Error	4,783
Std. Deviations	27,06

Based on the average systolic blood pressure before administering the drug valsartan to hypertensive patients with kidney failure at Citra Husada Hospital Jember in the 2022 period according to table 5.6, it is 165.87 mmHg. In theory (Smelzer, 2013) states that someone who experiences systolic blood pressure of 120-139 mmHg is considered prehypertension. Hypertension can cause dangerous complications if not treated quickly, it can cause complications of kidney failure, stroke, heart failure. Kidney failure development is progressive and slow and the ability to maintain volume and fluid in the body and in normal food intake (Tsinghua & Hospital, 2017).

Table 4. Data on systolic blood pressure after administering the drug valsartan to hypertensive patients with kidney failure at Rumah Jember in the 2022 period.

Respondent	Systolic Blood Pressure
N	32
Mean	151,15 mmHg
Median	154,00 mmHg
Std. Error	4,607
Std. Deviations	26,06

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Based on the average data above, it shows that systolic blood pressure after administering the drug valsartan to hypertensive patients with kidney failure at Jember Hospital according 151.15 mmHg. According to Smelzer 2013, a person who has hypertension with a systolic blood pressure of 140-159 mmHg is classified as grade 1 hypertension. In this study, the classification according to JNC VIII, the blood pressure of hypertensive patients is between 140-159 mmHg from the research results, which indicates grade 1 hypertension. Systolic blood pressure can increases due to reduced elasticity of blood vessels due to increasing age up to seventh, while diastolic blood pressure can increase until fifth or sixth and can persist or decrease (Aprillia, 2020);(Mayasari, 2020). Diastolic blood pressure is the minimum pressure that blood flows into the blood vessels (Zunnur, 2019).

Table 5. Data on diastolic blood pressure before administering the drug valsartan to hypertensive patients with kidney failure at Jember Hospital in the 2022 period.

Respondent	Diastolic Blood Pressure
N	32
Mean	92,81 mmHg
Median	94,00 mmHg
Std. Error	3,564
Std. Deviations	20,166

Based on the data above, it shows that the average diastolic before administering the drug valsartan to hypertensive patients with kidney failure at Jember Hospital according is 98.81 mmHg. The criteria for patients in this study according to JNC VIII are patients with blood pressure of 90 -99 mmHg. The research results indicate grade 1 hypertension. Diastolic pressure is the lowest pressure that occurs when the ventricles are resting and filling their chambers. Blood pressure is usually described as the ratio of systolic pressure to diastolic pressure. , with adult scores ranging from 100/60 to 140/90. The average normal blood pressure is 120/80 (Manansang et al., 2018).

Table 6. Data on diastolic blood pressure after administering the drug valsartan to hypertensive patients with kidney failure at Jember Hospital in the 2022 period.

Respondent	Diastolic Blood Pressure
N	32
Mean	81,09 mmHg
Median	80,00 mmHg
Std. Error	3,329
Std. Deviations	18,832

Based on the data above, it shows that the average diastolic blood pressure after administering the drug valsartan to hypertensive patients with kidney failure at Jember Hospital according is 81.09 mmHg. And the criteria for patients in this study according to JNC VIII were patients with blood pressure of 80-89. The results showed prehypertension.

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Diastolic blood pressure is blood pressure when the heart relaxes and refills with blood (Aprillia, 2020).

According to Sherwood 2011, systolic blood pressure is the maximum pressure generated in the arteries when blood is sprayed into the vessels, the average systolic pressure is 120 mmHg. Diastolic pressure is the minimum pressure in the arteries when blood flows out into smaller downstream vessels, the average is 80 mmHg.

Blood pressure is the pressure produced by blood against blood vessels, systolic blood pressure is more than 140 mmHg and diastolic blood pressure is more than 90 mmHg (Zunnur, 2019).

Table 7. Systolic blood pressure data before and after administering the drug valsartan to hypertensive patients with kidney failure in the 2022 period.

Respondent	Systolic Blood Pressure		Difference
	Before	after	
Mean	165,87 mmHg	151,15 mmHg	14,72 mmHg
Median	170,00 mmHg	154,00 mmHg	16,00 mmHg
Std. Error	4,783	4,607	0,176
Std. Deviations	27.06	26.06	1,00

Based on the average table above, the systolic blood pressure before administering the drug valsartan to hypertensive patients with kidney failure at Jember House according is 165.87 mmHg with a standard deviation of 27.06. The average systolic blood pressure after administering the drug valsartan to hypertensive patients with kidney failure in is 151.15 mmHg with a standard deviation of 26.06. The average difference in systolic blood pressure before and after administering the drug valsartan was 14.72 mmHg.

According to the Seventh Report of the Joint National Committee of Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-7), the main choices of antihypertensive drugs in patients with chronic kidney failure are ACEI and ARB. However, research conducted at Kandow Hospital from June to July 2014 showed that the drug most commonly used in Chronic Kidney Failure patients, in the single therapy group, was Calcium Channel Blocker (CCB) (Paranoan et al., 2019). Research by Gultom, R and Harahap, A (2021) on evaluating the use of antihypertensive drugs in elderly patients at Imelda Hospital, Medan. The results of the study showed that the use of CCB and ARB antihypertensive drugs used for elderly outpatients was 21.9 and first line medications commonly used for initial treatment of hypertension include: diuretics, (β-blockers), inhibitors. Angiotensin-Converting Enzyme (ACE-inhibitor), angiotensin receptor blocker (ARB) and calcium antagonist (Calcium Channel Blocker) (Gultom, 2022).

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Table 8. Diastolic blood pressure data before and after administering the drug valsartan to hypertensive patients with kidney failure in the 2022 period.

	Diastolic Blood Pressure		
Respondent	Before	after	Difference
Mean	92,81 mmHg	81,09 mmHg	11,72 mmHg
Median	94,00 mmHg	80,00 mmHg	14,00 mmHg
Std. Error	3,56	3,32	0,24
Std. Deviations	20,16	18,8	1,36

Based on the average above, it shows that the diastolic blood pressure before administering the drug valsartan to hypertensive patients at Jember House in table 5.8 is 92.81 mmHg with a standard deviation of 20.16. And the average diastolic blood pressure after administering the drug valsartan in the table above 5.10 is 81.09 mmHg with a standard deviation of 18.8 mmHg. The average difference in diastolic blood pressure before and after administering the drug valsartan was 11.72 mmHg. Diastolic blood pressure is the minimum blood pressure that can be heard before the next contraction, namely when the heart muscle relaxes and the heart refills (Suryansyah et al., 2019).

Researchers that this research is in accordance with factors that can trigger hypertension such as irregular eating patterns and peak pressure that occurs when the ventricles contract and is called systolic pressure, diastolic pressure with the lowest pressure with normal adult values ranging from 100/60 mmHg to 140/90 mmHg.

Table 9. Test Results *Wilcoxon Signed Ranks Test* Systolic blood pressure before and after administration of the drug valsartan in hypertensive patients with kidney failure in the period 2022

	SYSTOLIC BEFORE-SYSTOLIC AFTER	
WITH	- 3,875	-3,875
Asymp. Sig. (2- tailed)	0,000	0,000

Based on test result data *Wilcoxon Signed Ranks Test* in table 5.10 it is known that at the 95% confidence level (α = 0.05) the results obtained for systolic blood pressure before and after with p = 0.000, and where p = 0.000 systolic blood pressure before and after < α = 0.05, then H_0 rejected, that is, it can be interpreted that there is a change in systolic blood pressure before and after administering the drug valsartan to hypertensive patients with kidney failure in the 2022 period. The Z value = - 3.875 means that there is a change in systolic blood pressure before and after administering the drug valsartan, namely decreasing.

And the data were analyzed using the SPSS version 25 program. In the first stage, a normality test was carried out, where the normality test or Shpiro Wilk test was to find out whether the data obtained was normal or not, the data test results used Shipro Wilk with an average of > 0.05 then the distribution is declared normal and if <0.05 it is declared abnormal then the Wilcoxon test is carried out. If the Wilcoxon signed test gives p (sig.) <

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0.05, which means there is a change in systolic and diastolic blood pressure before and after, the Wilcoxon test is a non-parametric test that is used to measure the difference between two groups of paired data on an ordinal or interval scale but the data is distributed abnormal.

Table 10. Test Results *Wilcoxon Signed Ranks Test* diastolic blood pressure before and after administration of the drug valsartan in hypertensive patients with kidney failure in the period 2022.

	DIASTOLIC BEFORE –DIASTOLIC AFTER	
WITH	- 4,289	-4,289
Asymp.Sig. (2-tailed)	0,000	0,000

Based on test result dataWilcoxon Signed Ranks Test in table 5.11 and it is known that with a 95% confidence level (α = 0.05) the diastolic blood pressure results before and after with p = 0.000, and where p = 0.000 diastolic blood pressure before and after < α = 0.05, then H0 rejected and can be interpreted as a change in systolic blood pressure before and after administering the drug valsartan in hypertensive patients with kidney failure in the 2022 period. And it is known that the Z value is a score of = -4.289, meaning there is a change in diastolic blood pressure before and after administering the drug valsartan, namely decreasing.

And the data was analyzed using the SPSS version 25 program. In the first stage, a normality test was carried out, where the normality test or Shpiro Wilk test was to find out whether the data obtained was normal or not, the data test results used Shipro Wilk with an average of > 0, 05 then the distribution is declared normal and if <0.05 it is declared abnormal then the Wilcoxon test is carried out, and valsartan works by selective inhibition of type I angiotensin II receptors. Valsartan is an angiotensin II receptor blocker, valsartan is available in doses of 10, 20 , 40 80, 160, and 320 mg, the antihypertensive effect of valsartan at a dose of 80 mg, with the threshold dose that can reduce blood pressure is 1 mg/kgBB. The frequency of valsartan is to be taken twice a day before or after meals so that blood pressure is controlled and decreased. Compared to other groups of angiotensin receptor blockers, valsartan is considered to have a faster, greater and better antihypertensive effect. side which is also lighter (Alvarino, 2012).

CONCLUSION

Based on data from research results and discussion regarding changes in blood pressure in hypertensive patients with kidney failure when administering the drug valsartan and from the results of analysis of systolic and diastolic blood pressure before and after administration of the drug valsartan and using the Wilcoxon test, it shows changes in blood pressure that are characterized by controlled blood pressure and decrease.

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