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Comparison of Blood Pressure and Blood Glucose Levels in Chronic Kidney Failure Patients Before and After Hemodialysis Treatment in RSMH Palembang

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Abstrak

Gagal ginjal kronik ditandai dengan menurunnya fungsi ginjal secara ireversibel yang telah berlansung lebih dari tiga bulan dengan nilai laju filtrasi glomerulus kurang dari 15 ml/menit/1,73m2. Hemodialisis merupakan salah satu terapi pengganti ginjal yang paling sering dilakukan, namun hemodialisis memiliki komplikasi terhadap perubahan tekanan darah dan kadar gula darah. Penelitian ini bertujuan untuk mengetahui perbandingan tekanan darah dan kadar gula darah pada pasien gagal ginjal kronik sebelum dan sesudah hemodialisis di unit hemodialisis RSUP dr. Mohammad Hoesin Palembang. Penelitian ini merupakan penelitian observasional analitik dengan desain longitudinal menggunakan pengukuran berulang. Subjek penelitian adalah 74 pasien gagal ginjal kronik yang memenuhi kriteria inklusi dan eksklusi. Data penelitian diperoleh melalui data primer (pengukuran dan wawancara) dan dianalisis menggunakan Paired T-Test dan Wilcoxon. Rata-rata tekanan darah sebelum hemodialisis adalah 150,14 ± 30,045 mmHg (sistolik) dan 83,99 ± 16,469 mmHg (diastolik) serta sesudah hemodialisis adalah 159,66 ± 33,570 mmHg (sistolik) dan 86,35 ± 15,534 mmHg (diastolik). Rata-rata kadar gula darah sebelum hemodialisis adalah 161,61 ± 80,750 mg/dl serta sesudah hemodialisis adalah 131,51 ± 49,430 mg/dl. Hasil uji Paired T-Test menunjukkan perbandingan tekanan sistolik yang signifikan (p = 0,007), sedangkan hasil uji Wilcoxon menunjukkan perbandingan diastolik yang tidak signifikan (p = 0,193) dan perbandingan kadar gula darah yang signifikan (p = 0,000). Terdapat perbandingan tekanan darah sistolik yang signifikan, tekanan darah diastolik yang tidak signifikan, dan kadar gula darah yang signifikan sebelum dan setelah hemodialisis pada pasien gagal ginjal kronik di RSUP dr. Mohammad Hoesin Palembang.

Kata kunci:hemodialisis, tekanan darah, kadar gula darah

Abstract

Comparison of Blood Pressure and Blood Glucose Levelsin Chronic Kidney Failure Patients Before and After Hemodialysis Treatment in RSMH Palembang. Chronic kidney failure is irreversible decrease of kidney function with glomerular filtration rate < 15 ml/minute/1,73m2 for more than three months. Hemodialysis is the one of the most used kidney replacement therapy, but it has the complication for change of blood pressure and blood glucose levels. The goal of this research is to see the difference of blood pressure and blood glucose levels of chronic kidney failure patients before and after hemodialysis in hemodialysis unit of RSUP dr. Mohammad Hoesin Palembang. This is the observational research using longitudinal design with repeated measure. There were 74 patients who met the inclusion and exclusion criteria. Primary data was obtained by measuring and interview, and also analyzed using Paired T-Test and Wilcoxon. Results: The average of blood pressure before hemodialysis was 150,14 ± 30,045 mmHg (systolic) and 83,99 ± 16,469 mmHg (diastolic) and blood pressure after hemodialysis was 159,66 ± 33,570 mmHg (systolic) and 86,35 ± 15,534 mmHg (diastolic). The average of blood glucose level before hemodialysis was 161,61 ± 80,750 mg/dl and after hemodialysis was 131,51 ± 49,430 mg/dl. Paired T-Test showed significant systolic blood pressure comparison (p = 0,007). Wilcoxon showed not significant diastolic blood pressure comparison (p = 0,193) and significant blood glucose levels comparison (p = 0,000). There was significant systolic blood pressure comparison, there was not significant diastolic blood pressure comparison, and there was significant blood glucose levels comparison after hemodialysis treatment in chronic kidney failure patients in RSUP dr. Mohammad Hoesin Palembang.

Keywords: *hemodialysis, blood pressure, blood glucose levels*

1. Introduction

Chronic kidney disease is a disease with various etiologies which ultimately causes a progressive decline in kidney function. The process of deteriorating kidney function will cause kidney failure. Chronic kidney failure is characterized by an irreversible decrease in kidney function that has lasted more than three months with a glomerular filtration rate of less than 15 ml/minute/1.73m2 that requires renal replacement therapy[1].

The population of the Indonesian population diagnosed with chronic kidney failure at the age of 15 years is 0.2% with the highest prevalence found in Central Sulawesi (0.5%), while the prevalence of the population of South Sumatra experiencing chronic renal failure is around 0.1%[2]. As patients with chronic kidney failure increase, patients undergoing hemodialysis therapy are also increasing[3].

Hemodialysis is the most common kidney replacement therapy in many countries[4]. Hemodialysis is also routinely carried out in Indonesia[5].The principle of hemodialysis is the process of diffusion of waste metabolic substances through the semipermeable membrane to the dialysate so that these substances can be removed from the body and can replace kidney function[6].

Hemodialysis can also cause many complications. Complications that can occur are intradialytic hypertension, which is an increase in blood pressure of more than 10 mmHg after undergoing hemodialysis[7]. Intradialytic hypertension occurs in 54% of patients with chronic renal failure undergoing hemodialysis[3]. Factors that can cause intradialytic hypertension are volume overload, activation of the RAAS system, excessive ultrafiltration, sympathetic overactivity, erythropoietin induction therapy, elimination of antihypertensive drugs, and endothelial dysfunction. Intradialytic hypertension can increase patient mortality, especially cardiovascular-related[8]. Another complication that can occur is intradialytic hypotension, which is a decrease in blood pressure of more than 20 mmHg after undergoing hemodialysis. Factors that play a role are lower dry weight, high intradialytic weight gain, use of dialysate acetate, excessive use of antihypertensive drugs, consumption of food during hemodialysis, high dialysate temperature, and the presence of autonomic neuropathy[6].

Hemodialysis can also cause a significant decrease in blood sugar levels, both in patients who have diabetes mellitus or not[9]. This can occur because the process of diffusion of the patient's blood sugar into the dialysate due to the use of glucose-free dialysate and the transfer of blood sugar to erythrocytes due to changes in acidity in the erythrocyte cytoplasm. Post-dialysis hypoglycemia can occur after the patient has undergone hemodialysis, with mild to severe symptoms such as decreased consciousness, coma, and death[10].

Based on research conducted by Ferdi in 2016 at the RSUD dr. Ibnu Sutowo Baturaja, hemodialysis hasda significant influence on changes in blood pressure before and after undergoing hemodialysis, especially systolic blood pressure where blood pressure increases[11]. The research conducted by Elisabet in 2013 at H. Abdul Moeloek Bandar Lampung Hospital concluded that there were significant differences in blood sugar levels between before and after undergoing hemodialysis where there was a decrease in blood sugar levels after hemodialysis[12].

Patients with chronic kidney failure who undergo hemodialysis every year increase, so this should be the focus of attention because hemodialysis can cause various complications, especially changes in blood pressure and decreased blood sugar levels after hemodialysis. Complications related to blood pressure and blood sugar levels can increase morbidity and mortality in patients with chronic renal failure undergoing hemodialysis, especially if these complications are not recognized by health workers who handle patients undergoing hemodialysis. Research

that directly examines the two variables both blood pressure and blood sugar levels in hemodialysis is also still a little done. Most studies only examine the effects of hemodialysis on blood pressure or blood sugar levels only. By examining both variables, researchers can analyze changes in blood pressure and blood sugar levels at the same time in patients who have diabetes mellitus or not after hemodialysis, considering patients with diabetes mellitus have complications related to blood pressure and blood sugar levels more often after undergoing hemodialysis. This is what prompted researchers to conduct research on the comparison of blood pressure and blood sugar levels in patients with chronic renal failure before and after hemodialysis in RSUP Moh. Hoesin Palembang on November 1, 2018 to November 16, 2018.

2. Method

This study is an observational analytic study using a longitudinal study design with repeated measurements. The research data was obtained through primary data with measurements of blood pressure and blood sugar levels and interviews. Sampling of 74 patients was done by consecutive sampling method. The inclusion criteria in this study were patients who underwent hemodialysis on 1 - 16 November 2018 who were willing to be examined and interviewed, while the exclusion criteria were blood sugar values unreadable on the glucometer. Then univariate analysis was performed to determine the frequency distribution and bivariate analysis with Paired T-Test or Wilcoxon to analyze the comparison of blood pressure and blood sugar levels.

patients with chronic renal failure undergoing

3. Result

Table 1 shows the characteristics of 74 CRF patients based on age, sex, HD frequency, age of first HD, consumption of antihypertensive drugs, oral DM drugs, and insulin use, history of hypertension and diabetes mellitus, age of first suffering from hypertension and diabetes mellitus, and eating as long as HD.

Men (74.3%) suffered more from CRF than women (25.7%). Age <45 years is the most age group (29.7%), while age 65 - 74 years is the least age group (13.5%). The age of the oldest patient is 73 years and the age of the youngest patient is 16 years. all patients undergo hemodialysis twice a week. Age <45 years is the first age group undergoing the most hemodialysis (36.5%), while the age of 65 - 74 years is the first age group to undergo the least hemodialysis (9.5%).

Amlodipine is the most widely used antihypertensive drug before HD (43.5%). There were 3 patients taking oral DM drugs, namely glimepiride, and acarbose (glucobay). Novorapid is the most widely used insulin (66.6%). The group of patients who had a history of hypertension alone was the most group (50.0%), while the group of patients who did not have a history of hypertension or diabetes mellitus was the least group (16.2%). The age of 40 - 49 years is the first age group to suffer from hypertension (41.4%), while the age of <20 years is the first age group to suffer from hypertension at least (5.2%). The age of 40 - 49 years is the first age group to suffer from diabetes mellitus (28.0%), while the age of 20-29 years is the first age group to suffer from diabetes mellitus at least (8.0%). Patients who ate during hemodialysis (77%) were more than those who did not eat during hemodialysis (23%).

Table 1. Characteristics of CRF Patients (n = 74)

Variable	Category	N	%
Age	< 45 years	21	28,4
	45 – 54 years	22	29,7
	55 – 64 years	21	28,4
	65 – 74 years	10	13,5
Sex	Man	55	74,3
	Woman	19	25,7
HD Frequency	2 times	74	100
First Age of HD	< 45 years	27	36,5
	45 – 54 years	22	29.7
	55 – 64 years	18	24,3
	65 – 74 years	7	9,5
Antihypertensive, Oral Diabetic, and Insulin Medication	Antihypertensive Drug	21	28,4
	Oral Diabetic Drug	2	2,8
	Insulin	2	2,8
	Antihypertensive + Oral Diabetic Drug	1	1,4
	Oral Diabetes Drug + Insulin	1	1,4
	Not All Three	47	63,5
Antihypertensive Medication	Amlodipin	10	43,5
	Amlodipin + Kandesartan	1	4,3
	Amlodipin + Klonidin	2	8,7
	Captopril	1	4,3
	Klonidin	3	13,0
	Kandesartan	2	8,7
	Nifedipin	1	4,3
	Valsartan	1	4,3
	Forgot Name of Drug	2	8,7
Oral Diabetes Medication	Glibenclamid	1	33,3
	Glimepiride	1	33,3
	Acarbose (Glucobay)	1	33,3
Insulin Medication	Novorapid	55	74,3
	Forgot Name of Insulin	19	25,7
Hypertension and DM History	Hipertensi Only	37	50,0
	DM Only	4	5,4
	Hipertensi and DM	21	28,4
	Not Both	12	16,2
First Age of Hypertension	< 20 years	3	5,2
	20 – 29 years	5	8,6
	30 - 39 years	8	13,8
	40 - 49 years	24	41,4
	50 - 59 years	13	22,4
	60 – 69 years	5	8,6
First Age of DM	20 – 29 years	2	8,0
	30 - 39 years	6	24,0
	40 - 49 years	7	28,0
	50 - 59 years	6	24,0
	60 – 69 years	4	16,0
Eat during HD	Yes	57	77
	No	17	23

Table 2 shows the comparison of blood pressure before and after hemodialysis in all patients with CRF and based on a history of diabetes mellitus, consumption of antihypertensive drugs, and eating for the last 1.5 hours of hemodialysis.

Based on the Kolmogorov-Smirnov normality test, systolic blood pressure data in all CRF patients before and after hemodialysis were normally distributed, so the Paired T-Test was used. The value of p_value = 0.007 (α <0.05), which means that there is a significant increase in systolic blood pressure before and after hemodialysis. The lowest systolic blood pressure before hemodialysis is 80 mmHg and after hemodialysis is 90 mmHg. The highest systolic pressure before hemodialysis is 250 mmHg and after hemodialysis is 280 mmHg.

Based on the Kolmogorov-Smirnov normality test, diastolic blood pressure data in all CRF patients before and after hemodialysis were abnormally distributed so that the Wilcoxon test was performed. The value of p_value = 0.193 (α> 0.05), which means that there is no significant increase in diastolic blood pressure before and after hemodialysis. The lowest diastolic pressure before hemodialysis is 60 mmHg and after hemodialysis is 50 mmHg. The highest diastolic pressure before hemodialysis is 120 mmHg and after hemodialysis is 110 mmHg.

Based on the Shapiro-Wilk normality test, systolic blood pressure data in patients with CRF who had DM before and after hemodialysis were normally distributed so that the Paired T-Test was used. The value of p_value = 0.019 (α <0.05), which means that there is a significant increase in systolic blood pressure in patients with CRF who suffer from DM before and after hemodialysis.

Based on the Shapiro-Wilk normality test, diastolic blood pressure data in CRF patients who have DM before and after hemodialysis are normally distributed so that Paired T-Test

is used. The value of p_value = 0.948 (α> 0.05), which means that there is no significant decrease in diastolic blood pressure in patients with CRF who suffer from DM before and after hemodialysis.

Based on the Shapiro-Wilk normality test, the systolic blood pressure data in CRF patients who did not experience DM before and after hemodialysis were normally distributed, so the Paired T-Test was used. The value of p_value = 0.081 (α> 0.05), which means that there is an insignificant increase in systolic blood pressure in patients with CRF who do not suffer from DM before and after hemodialysis.

Based on the Shapiro-Wilk normality test, diastolic blood pressure data in CRF patients who did not experience DM before hemodialysis were normally distributed and after hemodialysis were abnormally distributed, the Wilcoxon test was used. The value of p_value = 0.140 (α> 0.05), which means there is an insignificant increase in diastolic blood pressure in patients with CRF who do not suffer from DM before and after hemodialysis.

Based on the Shapiro-Wilk normality test, systolic blood pressure data in patients with CKD + Hypertension who consumed antihypertensive drugs before and after hemodialysis were normally distributed, so the Paired T-Test was used. The value of p_value = 0.869 (α> 0.05), which means there is an insignificant increase in systolic blood pressure in patients with CRD + hypertension who take antihypertensive drugs before and after hemodialysis.

Based on the Shapiro-Wilk normality test, diastolic blood pressure data in CRF + Hypertension patients who consumed antihypertensive drugs before and after hemodialysis were normally distributed, so the Paired T-Test was used. The value of p_value = 0.958 (α> 0.05), which means that there is no significant decrease in diastolic blood pressure in patients with CRD + hypertension who take antihypertensive drugs before and after hemodialysis.

Based on the Shapiro-Wilk normality test, systolic blood pressure data in patients who consumed food for the last 1.5 hours of hemodialysis before and after hemodialysis were normally distributed, so the Paired T-Test was used. The value of p_value = 0.012 (α <0.05), which means that there is a significant increase in systolic blood pressure in patients who consume food for the last 1.5 hours of hemodialysis before and after hemodialysis.

Based on the Shapiro-Wilk normality test, diastolic blood pressure data in patients who consumed food during the last 1.5 hours of hemodialysis before and after hemodialysis were normally distributed, so the Paired T-Test was used.The value of p_value = 0.145 (α> 0.05), which means that there is no significant decrease in diastolic blood pressure in patients who consume food for the last 1.5 hours of hemodialysis before and after hemodialysis.

Tabel 2. Comparison of Blood Pressure Before and After Hemodialysis

Variable	Blood Pressure	Before HD	After HD	*P value*
All Patients with CRF	Systolic	150,14 ± 30,045	159,66 ± 33,570	0,007
	Diastolic	83,99 ± 16,469	86,35 ± 15,534	0,193
Patients with CRF and DM	Systolic	151,20 ± 24,035	163,40 ± 25,929	0,019
	Diastolic	88,00 ± 16,771	87,80 ± 15,349	0,948
Patients with CRF and non-DM	Systolic	149,59 ± 32,911	157,76 ± 36,969	0,081
	Diastolic	81,94 ± 16,099	85,61 ± 15,733	0,140
Antihypertensive Medication Before HD	Systolic	154,35 ± 24,648	155,22 ± 27,447	0,869
	Diastolic	85,00 ± 18,278	84,78 ± 16,479	0,958

Eat for the Last 1.5 Hours of HD	Systolic	164,00 ± 36,801	148,67 ± 34,614	0,012
	Diastolic	88,67 ± 17,674	80,67 ± 18,310	0,145

Table 3 shows the comparison of blood sugar levels before and after hemodialysis in all patients with CRF and based on a history of diabetes mellitus, consumption of oral DM drugs, use of insulin and feeding during hemodialysis.

Based on the Kolmogorov-Smirnov normality test, blood sugar levels in all CRF patients before hemodialysis were abnormally distributed and blood sugar levels after hemodialysis were normally distributed, so the Wilcoxon test was used. The value of p_value = 0,000 (α <0.05), which means that there is a significant decrease in blood sugar levels before and after hemodialysis. The lowest blood sugar level before hemodialysis is 69 mg / dl and after hemodialysis is 65 mg / dl. The highest blood sugar level before hemodialysis is 427 mg / dl and after hemodialysis is 278 mg / dl.

Based on the Shapiro-Wilk normality test, the blood sugar level data in CRF patients who had DM before and after hemodialysis were normally distributed, so the Paired T-Test was used. The value of p_value = 0.002 (α <0.05), which means that there is a significant decrease in blood sugar levels in CRF patients who suffer from DM before and after hemodialysis.

Based on the Shapiro-Wilk normality test, blood sugar level data in patients with CRF who did not experience DM before and after hemodialysis were normally distributed, so the Paired T-Test was used. The value of p_value = 0.032 (α <0.05), which means that there is a significant decrease in blood sugar levels in CRF patients who do not suffer from DM before and after hemodialysis.

Based on the Shapiro-Wilk normality test, blood sugar level data in patients with CRF + DM who took oral DM drugs before and after hemodialysis were normally distributed, so the Paired T-Test was used. The value of p_value = 0.092 (α> 0.05), which means that there is no significant decrease in blood sugar levels in patients with CRF + DM who take oral DM drugs before and after hemodialysis.

Based on the Shapiro-Wilk normality test, blood sugar level data in patients with CRF + DM who use insulin before hemodialysis are abnormally distributed and after hemodialysis are normally distributed, so the Wilcoxon test is used. The value of p_value = 0.109 (α> 0.05), which means there is a significant decrease in blood sugar levels in patients with CRF + DM who use insulin before and after hemodialysis.

Based on the Kolmogorov-Smirnov normality test, blood sugar level data in patients with CRF consuming food during hemodialysis before and after hemodialysis are normally distributed, so the Paired T-Test was used. The value of p_value = 0.021 (α <0.05), which means that there is a significant decrease in blood sugar levels in CRF patients who consume food during hemodialysis before and after hemodialysis.

Based on the Shapiro-Wilk normality test, the blood sugar level data in patients with CRF not consuming food during hemodialysis before hemodialysis were abnormally distributed and after hemodialysis were normally distributed, the Wilcoxon test was used. The value of p_value = 0,000 (α <0.05), which means that there is a significant decrease in blood sugar levels in CRF patients who do not eat food during hemodialysis before and after hemodialysis.

Tabel 3. Comparison of Blood Glucose Level Before and After Hemodialysis

Variabel	Blood Glucose Level		*P value*
	Before Hemodialisis	After Hemodialisis	
All Patients with CRF	161,61 ± 80,750	131,51 ± 49,430	0,000
Patients with CRF and DM	212,80 ± 113,398	153,20 ± 53,927	0,002
Patients with CRF and non-DM	135,49 ± 37,761	120,45 ± 43,496	0,032
Anti Diabetic Oral Medication Before HD	250,00 ± 79,981	134,33 ± 40,821	0,092
Insulin Medication Before HD	317,67 ± 242,776	153,00 ± 55,218	0,109
Eat During HD	151,75 ± 62,879	135,65 ± 48,922	0,021
Don't Eat During HD	194,65 ± 120,027	117,65 ± 50,057	0,000

4. Discussion

Distribution of CRF Patients Undergoing Hemodialysis

In this study obtained from 74 patients with chronic kidney failure, men (74.3%) had more hemodialysis than women (25.7%). This is in accordance with the data from the Basic Health Research which reports that men undergo more hemodialysis than women with a ratio of 3: 2[13]. Most patients underwent hemodialysis in the age range of 45 - 54 years (29.7%). This is in accordance with the Indonesian Renal Registry report which states that the age group 45-64 is the most age group in patients undergoing hemodialysis[3].

There were 78.4% of patients who had a history of hypertension and 33.8% of patients who had a history of diabetes mellitus. This is in line with Indonesian Renal Registry data which reports that hypertension (44%) is a concomitant disease that is more common in patients with chronic renal failure than diabetes mellitus (22%)[3].

Amlodipine (13.6%) is the type of antihypertensive drug that is most consumed by patients with chronic renal failure and hypertension before undergoing hemodialysis. This is consistent with research conducted at Hakeem Abdul Hamid Hospital Centenary, India which states that Calcium Channel Blocker drugs are most often given because they do not experience excretion during dialysis and are associated with lower mortality and cardiovascular events[14].

Comparison of Blood Pressure Before and After Hemodialysis

In this study it was found that there was a significant increase between systolic blood pressure before and after hemodialysis (p = 0.007), whereas diastolic blood pressure did not increase significantly (p = 0, 193). This is in line with the research conducted by Ferdi in 2016 at Ibnu Sutowo Regional Hospital in Baturaja that there was an effect of hemodialysis on changes in systolic blood pressure (p = 0.001) and diastolic (p = 0.686)[11].The ultrafiltration process during hemodialysis causes a decrease in vascular volume which induces activation of the Angiotensin Renin Aldosterone System (RAAS) so that an increase in blood pressure increases after undergoing hemodialysis.

The high number of patients who have a history of hypertension (78.4%) plays a role in causing an increase in blood pressure after undergoing hemodialysis because intradialytic hypertension is more common in patients who have a history of predialysis hypertension[15]. Use of bicarbonate dialysate in RSUP hemodialysis unit Dr. Moehammad Hoesin Palembang reduced the incidence of intradialisis hypotension. The study was conducted on 41 patients with stable chronic renal failure in dr. Soetomo Surabaya showed that the incidence of intradialytic hypotension was more common with the use of dialysate acetate than dialysate bicarbonate (56.1% vs 2.4%)[16]. Diastolic blood pressure dysfunction that is often experienced by patients undergoing dialysis plays a role in increasing diastolic blood pressure which is not

significant after undergoing hemodialysis. Diastolic blood pressure is often found to be higher in younger patients and decreases with age. This also causes an increased incidence of isolated hypertension in older patients undergoing hemodialysis[17].

An increase in post-dialysis systolic blood pressure is associated with an increased risk of cardiovascular mortality and other causes for the next four years. This can indicate the occurrence of excess fluid volume in patients subclinically, so it is recommended to evaluate the status of the fluid[18].

Systolic blood pressure in patients with CRF + DM experienced a significant increase after undergoing hemodialysis. Research conducted by Amalia in 2015 on hemodialysis using dialysate bicarbonate reported that a history of diabetic kidney disease is a risk factor for the occurrence of intradialytic hypertension. Endothelial dysfunction in DM patients causes a decrease in levels of Nitric Oxide (NO) which acts as a vasodilator[19].

The increase in systolic pressure experienced by patients taking antihypertensive drugs before undergoing hemodialysis (0.97 mmHg) is lower than the increase in systolic pressure on average for all patients undergoing hemodialysis (9.52 mmHg). This is because antihypertensive therapy can reduce blood pressure in patients undergoing hemodialysis effectively[20].

Patients who consumed food during the last 1.5 hours during the hemodialysis session experienced a decrease in systolic and diastolic blood pressure, especially systolic pressure which decreased significantly (p = 0.012). This is in line with the research conducted by Shavinglam et al., Which states that a significant decrease in blood pressure after undergoing hemodialysis lasts up to 90 minutes because the body will reduce the return and accumulation of venous blood by reducing systemic vascular resistance.[21].

Comparison of Blood Sugar Levels Before and After Hemodialysis

In this study it was found that there was a significant decrease in blood sugar levels before and after hemodialysis (p = 0,000). This research is in accordance with the research conducted by Elisabet at H. Abdul Moeloek Hospital in Bandar Lampung where there was a significant decrease in blood sugar levels of 42 ± 28.2 mg / dl after undergoing hemodialysis. This is because in the hemodialysis process there is a concentration gradient between blood glucose and dialysate so that the patient's glucose moves to dialysate[12]. Decreasing blood sugar levels after undergoing hemodialysis can cause hypoglycemia which also increases with increasing hemodialysis. Hypoglycemia can result in increased awareness, seizures, and even coma until death[10].

Blood sugar levels decreased significantly after hemodialysis in both patients with CRF who had DM (p = 0,000) or did not experience DM (p = 0.018), but the decrease in blood sugar levels experienced by patients with DM (59.60 mg / dl) was greater compared to patients who did not develop DM (15.04 mg / dl). These results are in accordance with the research conducted by Sakla and Sheriff at the Dialysis and Nephrology Unit, Zagazig, Egypt where the decrease in sugar levels in patients with DM was greater than those without DM (88.3 mg / dl compared to 39.8 mg / dl) Patients who have diabetes mellitus have a higher concentration gradient between blood sugar and dialysate, in addition, a worse state of insulin resistance and glycemic control in patients with diabetes mellitus than those who do not have diabetes mellitus can cause this[13].

Patients who took oral DM drugs and used insulin before undergoing hemodialysis experienced a significant decrease in blood sugar (p = 0.092 and p = 0.109). This is in accordance with research conducted at the National Diabetes Center, Jordan in 2015 which showed patients with good glycemic

control had insignificant decreases in blood sugar levels[18].

Decreased blood sugar levels in patients who did not eat during hemodialysis (77 mg / dl) were greater than those who ate (16.50 mg / dl). These results are in line with research conducted at the Dialysis and Nephrology Unit, Egypt in 2015 where non-DM patients who consumed food had lower blood sugar levels (18.8 mg / dl) which were smaller than those who did not eat food (70.3 mg / dl)[13].

5. Conclusion

Characteristics of CRF patients undergoing hemodialysis at RSUP dr. Mohammad Hoesin Palembang is:

a Patients who undergo hemodialysis are mostly in the age group 45 - 54 years (28.4%)
b There were 55 men (74.3%) and 19 women (25.7%) who underwent hemodialysis
c All patients undergo hemodialysis twice a week
d Patients who underwent the first hemodialysis at most when in the age group <45 years (36.5%)
e Amlodipine is the most widely used antihypertensive drug before undergoing hemodialysis (13.6%)
f Glibenclamid, glimepiride, and acarbose (glucobay) are oral anti-DM drugs taken before undergoing hemodialysis.
g Novorapid is the most widely used insulin before undergoing hemodialysis (66%)
h There were 57 patients (77%) who consumed food during hemodialysis
i People with chronic renal failure first had hypertension at most when they were 40 - 49 years old (41.1%)
j The first patients with chronic renal failure have diabetes mellitus when they are 40-49 years old (28%)

There is a significant comparison of systolic blood pressure before and after hemodialysis in all patients with CRF, CRF + DM, and eating for the last 1.5 hours of HD. Meanwhile, there was an insignificant comparison of systolic blood pressure before and after hemodialysis in patients with CRD + non-DM and taking antihypertensive drugs before HD.

There was no significant comparison of diastolic blood

There is a significant comparison of blood sugar levels before and after hemodialysis in all patients with CRF, CRD + DM, CRF + non-DM, tombs during HD, and not eating during HD. Meanwhile, there were insignificant comparisons of blood sugar levels before and after hemodialysis in patients taking oral DM drugs and insulin before HD.

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