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The Effect of Hemodialysis Therapy on Blood Glucose Levels in Patients in the Hemodialysis Room Prof. Dr. H. Aloei Saboe General Hospital Gorontalo City

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Article Info

ABSTRACT

Hemodialysis generally functions to remove metabolic waste products that cause a decrease in blood glucose levels. The purpose of this study was to determine the effect of hemodialysis therapy on blood glucose levels in patients in the hemodialysis room at Prof. Dr. H. Aloei Saboe Regional General Hospital in Gorontalo City.

The research method used was quantitative research with a quasi-experimental design and a one-group pre-post test design. The sample consisted of 26 respondents using purposive sampling technique.

The Wilcoxon test yielded a p-value of 0.000 (p-value < 0.05), indicating that hemodialysis therapy affects blood glucose levels in patients in the hemodialysis room at Prof. Dr. H. Aloei Saboe Regional General Hospital in Gorontalo City. Hemodialysis therapy can reduce the burden of uremic toxins that previously interfered with insulin sensitivity. After dialysis, cellular response to insulin improves, allowing blood glucose levels to be controlled more effectively. It is hoped that this will yield positive results in enhancing the quality of nursing care for patients undergoing hemodialysis therapy, particularly in measuring blood glucose levels. Hemodialysis therapy should be performed to measure blood glucose levels.

INTRODUCTION

Chronic kidney disease (CKD) is a global health problem with an increasing prevalence. One of the main therapies in the end stage of CKD is hemodialysis (HD), which is a procedure to cleanse the blood of toxic substances, excess fluids, and electrolytes using a dialyzer as an artificial kidney (Ambarita, 2022). The kidneys play a very important role in maintaining overall health, as they are one of the vital organs in the body. If the kidneys do not function properly, health problems related to chronic kidney disease will occur. The prevalence of chronic kidney disease increases along with the increasing number of cases of diabetes mellitus and hypertension (Ambarita, 2022).

According to the Global Burden of Disease Study (2019), the number of people with chronic kidney disease (CKD) reached more than 850 million worldwide, making it one of the leading causes of death globally. Of this number, approximately 3 million people undergo renal replacement therapy (dialysis or transplantation), and more than 2 million patients undergo routine hemodialysis (GBD, 2019). In Indonesia, based on data from the Indonesian Renal Registry (IRR) in 2022, there are more than 120,000 patients undergoing hemodialysis therapy, with most patients suffering from complications of diabetes mellitus as the main cause of end-stage renal failure (IRR, 2022). In Gorontalo Province, specifically at Prof. Dr. H. Aloei Saboe Regional General Hospital as the referral hospital in Gorontalo Province, a large number of patients with CKD undergo routine hemodialysis. From January to September 2025, 78 people underwent routine hemodialysis therapy twice a week.

Hemodialysis generally serves to remove metabolic waste products, regulate electrolyte balance, and remove excess fluid. However, for patients with diabetes mellitus, hemodialysis can have an additional effect on blood glucose levels. Studies show that during the hemodialysis process, blood glucose levels are affected by several mechanisms, such as the removal of insulin by the dialyzer membrane, the loss of glucose into the dialysis fluid (especially if the fluid does not contain glucose), and increased insulin sensitivity during the hemodialysis process (Huang et al., 2020).

Based on the results of research by Huang et al. (2020), 37% of diabetic patients undergoing hemodialysis experience episodes of hypoglycemia during dialysis sessions. This study used continuous glucose monitoring (CGM) and found that the most significant glucose levels occurred within the first 1–2 hours of HD, with an average of 30–40 mg/dL from pre-dialysis levels.

Similar results were also reported by Zhang et al. (2021) in a study of 124 diabetic patients undergoing regular hemodialysis. They found that patients' blood glucose levels decreased significantly after dialysis, by an average of 28.7% from baseline levels. This study also noted that >37% of the initial glucose level could be used as a clinical indicator to predict the risk of intradialytic hypoglycemia with a sensitivity of 84.6% and specificity of 73%. Additionally, Tan et al. (2021) conducted a follow-up study with CGM in HD patients and found a characteristic pattern called rebound hyperglycemia, which is a spike in blood glucose that occurs approximately 2–3 hours after dialysis. This pattern primarily occurs in patients with poor glycemic control, the elderly, or those with low albumin levels. This indicates that HD not only lowers glucose during the procedure but also triggers significant fluctuations that pose a risk to the patient's metabolic stability.

Based on the initial observations conducted on June 19, 2025, on 10 respondents, where 5 respondents were taken from patients undergoing dialysis in the morning session and 5 respondents from patients undergoing dialysis in the afternoon session, the observation results showed that most patients undergoing routine hemodialysis were chronic kidney disease (CKD) patients, where hemodialysis was performed routinely twice a week. From the results of observations conducted on patients undergoing hemodialysis, some patients experienced symptoms such as weakness, cold sweats, and restlessness during hemodialysis. Reports from hemodialysis room staff indicated that mild to moderate hypoglycemia often occurred. Currently, monitoring of blood glucose levels before and after dialysis has not been carried out comprehensively and systematically, especially in non-diabetic patients who may also experience glucose fluctuations due to the cleansing effect of insulin during dialysis. However, patients who are not examined by staff, especially outpatients, have been educated to be able to check their blood glucose levels independently.

Based on the background description above, the researcher was interested in conducting research on "the effect of hemodialysis on blood glucose levels in patients in the hemodialysis room at Prof. Dr. H. Aloei Saboe Regional General Hospital, Gorontalo City."

RESEARCH METHODS

This study was conducted from January 10 to January 21, 2025, in the hemodialysis room of Prof. Dr. H. Aloei Saboe Regional General Hospital in Gorontalo City. It was a quantitative study using a quasi-experimental research method with a one-group pre-post test design. Purposive sampling was used to select 65 respondents. The instruments used in this study were the hemodialysis SOP and observation sheets for blood glucose levels before and after hemodialysis.

RESULTS
Respondent Characteristics

Table 1. Respondent Characteristics Based on Age Category

No.	Usia	N	%
1.	Remaja Akhir	1	1.5%
2.	Dewasa Awal	4	6.2%
3.	Dewasa Akhir	14	21.5%
4.	Lansia Awal	20	30.8%
5.	Lansia Akhir	22	33.8%
4.	Manula	4	6.2%
	Total	65	100%

Sumber : Data Primer 2025

Based on the table above, it can be seen that the characteristics of respondents based on age are as follows: most respondents were in their late elderly years, totaling 22 respondents (33.8%), and a small number were in their late adolescence, totaling 1 respondent (1.5%).

Table 2. Respondent Characteristics Based on Gender

No.	Jenis Kelamin	N	%
1.	Laki-laki	28	43.1%
2.	Perempuan	37	56.9%
	Total	65	100%

Sumber : *Data Primer 2025*

Based on the table above, it can be seen that the distribution of respondents based on gender is as follows: the majority of respondents are male, totaling 17 respondents (65%), and a small number are female, totaling 9 respondents (35%).

Table 3. Respondent Characteristics Based on Comorbidities

No.	Penyakit Penyerta	N	%
1.	DM	6	9.2%
2.	DM, hipertensi	18	27.7%
3.	DM, hipertensi, asam urat	2	3.1%
4.	Hipertensi	33	50.8%
5.	Hipertensi, CHF	1	1.5%
6.	SLE, hipertensi	1	1.5%
7.	Tidak ada	4	6.2%
	Total	65	100%

Sumber : *Data Primer 2025*

Based on the table above, it can be seen that the characteristics of respondents based on comorbidities are as follows: most respondents had a history of hypertension, with 33 respondents (50.8%) reporting this condition.

Table 4. Respondent Characteristics Based on Dialyzer Type, Duration, and QB

Tipe Dialyzer			Durasi			QB		
Tipe Dialyzer	N	%	Durasi	N	%	QB	N	%
High Flux Dialyzer	65	100%	4 Jam	65	100%	160	1	1.5%
						170	2	3.1%
						200	56	86.2%
						210	1	1.5%
						220	5	7.7%
Total	65	100%	Total	65	100%	Total	65	100%

Sumber : *Data Primer 2025*

Based on the table above, it can be seen that the characteristics of respondents based on dialyzer type are as follows: all respondents used the high flux dialyzer type, totaling 65 respondents (100%). The characteristics of respondents based on duration show that all respondents used a duration of 4 hours, totaling 65 respondents (100%). The characteristics of respondents based on the QB used during hemodialysis show that most respondents used QB 200 for hemodialysis, totaling 56 respondents (86.2%).

Univariate Analysis

Table 5. Blood Glucose Levels Before and After Hemodialysis Therapy in the Hemodialysis Room of Prof. Dr. H. Aloei Saboe Regional General Hospital, Gorontalo City

No.	Kategori Gula Darah Sebelum HD	Sebelum hmeodialisis		Sesudah hemodialisis	
		N	%	N	%
1.	Normal	20	30.8%	33	50.8%
2.	Rendah	0	0%	1	1.5%
3.	Sedang	35	53.8%	31	47.7%
4.	Tinggi	10	15.4%	0	0%
	Total	65	100%	65	100%

Sumber : *Data Primer 2025*

Based on the table above, blood glucose levels before hemodialysis therapy were obtained. Most respondents had moderate blood glucose levels, totaling 35 respondents (53.8%), and a small number had high blood glucose levels, totaling 10 respondents (15.4%). After hemodialysis therapy, most respondents had normal blood glucose levels (33 respondents, 50.8%), while a small number had low blood glucose levels (1 respondent, 1.5%).

Bivariate Analysis

Table 6. The Effect of Hemodialysis Therapy on Blood Glucose Level Reduction in Patients in the Hemodialysis Room of Prof. Dr. H. Aloei Saboe Regional General Hospital, Gorontalo City

No.	Kadar Glukosa Darah	Hasil Uji Statistika					P-Value
		N	Mean	Std. Deviation	Min	Max	
1.	Kadar glukosa darah sebelum terapi hemodialisis	65	144.52	68.88	78.00	530.00	0.000
2.	Kadar glukosa darah sesudah terapi hemodialisis	65	112.92	25.60	69.00	178.00	

Sumber : *Data Primer 2025*

Based on the table above, the results of statistical analysis using the Wilcoxon test obtained a p-value $(0.000) < 0.05$, which means that there is an effect of hemodialysis therapy on lowering blood glucose levels in patients in the hemodialysis room at Prof. Dr. H. Aloei Saboe Regional General Hospital, Gorontalo City. This can also be seen in the mean values before hemodialysis therapy, where blood glucose levels had a mean value of 144.52, and after hemodialysis therapy, blood glucose levels had a mean value of 112.92.

DISCUSSION

Blood Glucose Levels Before Hemodialysis Therapy in the Hemodialysis Room of Prof. Dr. H. Aloei Saboe Regional General Hospital, Gorontalo City

Based on the results of a study of blood glucose levels before hemodialysis therapy in the hemodialysis room at Prof. Dr. H. Aloei Saboe Regional General Hospital in Gorontalo City, 35 respondents (53.8%) were found to have moderate blood glucose levels. This indicates that more than half of the respondents had blood glucose levels above the normal range but did not fall into the category of severe hyperglycemia.

Clinically, moderate blood glucose levels can indicate impaired fasting glucose (IFG) or prediabetes. According to the American Diabetes Association (2022), blood glucose levels in the range of 111–180 mg/dL are classified as prediabetes. This condition indicates that the body is beginning to experience insulin resistance or a decrease in insulin production, which can develop into type 2 diabetes mellitus if not managed properly. In patients undergoing hemodialysis, glucose metabolism disorders are more common due to changes in kidney function that cause insulin breakdown disorders, increased levels of uremic toxins in the blood, and oxidative stress. This process causes the body to be less responsive to insulin, so glucose levels tend to increase before dialysis. This is in line with the theory proposed by Perreault and Mather (2021), that chronic kidney disease is closely related to changes in insulin sensitivity and carbohydrate metabolism disorders.

The results of the study were obtained in the moderate glucose level category, with most of the respondents being female (19 respondents). This is in line with Guyton & Hall's (2021) theory, which states that women are closely related to hormonal factors, body composition, and glucose metabolism regulation. Estrogen plays an important role in increasing insulin sensitivity and glucose metabolism. However, fluctuations in estrogen and progesterone hormones that occur throughout a woman's life cycle—such as during the luteal phase, pregnancy, and menopause—can cause a gradual decrease in insulin sensitivity, resulting in blood glucose levels tending to be moderate.

This is supported by the results of a study conducted by Rahayu and Siregar (2023), which found that more than 50% of hemodialysis patients had blood glucose levels in the prediabetes range before dialysis and

experienced a decrease after dialysis. Another study by Nasution et al. (2022) also showed a similar pattern, where there were significant changes in blood glucose levels before and after hemodialysis due to diffusion and ultrafiltration mechanisms during the procedure.

The results of this study indicate that moderate blood glucose levels require clinical attention because they have the potential to develop into uncontrolled diabetes and increase the risk of complications such as cardiovascular disease, neuropathy, and other metabolic disorders in hemodialysis patients. Therefore, routine monitoring of blood glucose levels and educational interventions related to diet and lifestyle changes are essential in this group.

The results of the study on blood glucose levels before hemodialysis therapy in the Hemodialysis Room of Prof. Dr. H. Aloei Saboe Regional General Hospital in Gorontalo City also found that 20 respondents (30.8%) were in the normal category. This finding indicates that although most patients experience impaired blood glucose regulation, there is still a proportion of patients who have normal blood glucose levels before the hemodialysis procedure. Normal blood glucose levels reflect a balance between glucose production, insulin function, and glucose utilization by body tissues.

According to the American Diabetes Association (2022), blood glucose levels can be categorized as normal if they are in the range of 70–110 mg/dL on a blood glucose test. Blood glucose levels within this range indicate that the body still has good insulin regulation and glucose metabolism capabilities, even though the patient has chronic kidney disease (CKD) and undergoes routine hemodialysis therapy. Normal blood glucose levels indicate that glucose metabolism is still functioning properly and that the risk of metabolic complications is lower. In patients with chronic kidney disease, this condition may reflect good control of risk factors, such as adherence to diet, appropriate use of pharmacological therapy, and the absence or control of diabetes mellitus.

Physiologically, the kidneys play a role in glucose homeostasis through the processes of filtration, reabsorption, gluconeogenesis, and insulin degradation. Although kidney function declines in hemodialysis patients, some patients are still able to maintain normal blood glucose levels due to metabolic adaptation and optimal disease management (Thomas, 2020). This indicates that not all patients with chronic kidney failure experience severe glucose metabolism disorders.

These findings are consistent with those of Nasution, Pane, and Lubis (2022), who stated that some hemodialysis patients have normal blood glucose levels before dialysis, especially those who have undergone long-term hemodialysis therapy and have a low-glucose diet. Another study by Damanik (2020) also found that approximately 25–40% of hemodialysis patients had normal glucose levels before the procedure due to the effects of dietary regulation, antidiabetic drug control, and regular dialysis schedules.

Based on the results of research on blood glucose levels before hemodialysis therapy in the Hemodialysis Room of Prof. Dr. H. Aloei Saboe Regional General Hospital in Gorontalo City, it was also found that 10 respondents (15.4%) were in the high category. These results indicate that some patients experienced hyperglycemia before undergoing hemodialysis, indicating a significant disturbance in blood glucose regulation.

The study also found that most of the respondents with high blood glucose levels had a history of diabetes mellitus, with 8 respondents having this condition.

According to the American Diabetes Association (2022), the majority of patients with blood glucose levels ≥200 mg/dL have a history of previously diagnosed diabetes mellitus or poorly controlled diabetes. This condition confirms that severe hyperglycemia is a clinical indicator of uncontrolled DM. Blood glucose levels are categorized as high if the blood glucose test results are > 180 mg/dL, indicating diabetes mellitus or glucose metabolism imbalance. This condition can occur due to insulin resistance, insufficient insulin production, or a combination of both. In patients with chronic kidney disease, the risk of hyperglycemia increases due to decreased kidney function in insulin metabolism and increased systemic inflammation.

Increased blood glucose levels before hemodialysis can be influenced by various factors such as a history of diabetes mellitus, diet, adherence to antidiabetic medication, and physiological stress before undergoing the procedure. Perreault and Mather (2021) explain that patients with kidney disorders experience a decrease in the body's ability to manage glucose due to hormonal changes, accumulation of uremic toxins, and decreased insulin sensitivity, which can worsen hyperglycemia.

A study by Abe et al. (2019) on chronic kidney disease patients undergoing hemodialysis showed that patients with high blood glucose levels almost all had a history of DM. The study explains that a history of DM is a major factor in the occurrence of persistent hyperglycemia in patients with chronic diseases. This is also supported by the results of a study by Rahayu and Siregar (2023), which reported that approximately 18–30% of hemodialysis patients showed an increase in glucose levels before the dialysis procedure. This condition is also reinforced by a study by Nasution, Pane, and Lubis (2022), which states that patients with diabetes mellitus undergoing hemodialysis are more prone to fluctuations in blood glucose levels, especially before dialysis begins.

Blood Glucose Levels After Hemodialysis Therapy in the Hemodialysis Room of Prof. Dr. H. Aloei Saboe Regional General Hospital, Gorontalo City

Based on the results of a study of blood glucose levels after hemodialysis therapy in the hemodialysis room of Prof. Dr. H. Aloei Saboe Regional General Hospital in Gorontalo City, 33 respondents (50.8%) had blood glucose levels in the normal range after undergoing hemodialysis therapy. This finding indicates that most patients experienced a decrease or stabilization of blood glucose levels towards the normal range after the dialysis procedure. This condition can be interpreted as one of the positive effects of hemodialysis therapy in helping to control glucose metabolism in patients with chronic kidney failure.

Normal blood glucose levels after hemodialysis reflect the body's success in maintaining metabolic balance after the dialysis process. According to the American Diabetes Association (2022), normal blood glucose levels indicate good glucose regulation and reduce the risk of metabolic complications. In patients with chronic kidney disease, achieving normal glucose levels after hemodialysis is a favorable condition as it indicates a positive metabolic response to therapy.

A decrease in blood glucose levels after hemodialysis can occur due to the physiological mechanism of solute transfer through diffusion and ultrafiltration. Hemodialysis allows the removal of excess glucose and other metabolites from the blood through the dialyzer membrane (Romero et al., 2020). In some patients, especially those who do not use glucose dialysate or who are under good diabetes control, this process can lower glucose levels to within the normal range. In addition, insulin sensitivity after hemodialysis may increase. Hemodialysis is known to reduce uremic toxins that play a role in increasing insulin resistance (Mailloux & Bell, 2021). With decreased insulin resistance, the effectiveness of the insulin hormone in lowering blood glucose levels becomes more optimal, resulting in more stable glucose levels.

These findings are consistent with a study conducted by Pratiwi (2022), which showed that most hemodialysis patients experienced improved glycemic control after dialysis. The study explains that changes in glucose levels after hemodialysis may depend on factors such as the type of dialysate, duration of dialysis, type of diet, and use of antidiabetic drugs. Another study conducted by Rahayu and Siregar (2023) found that the proportion of patients with normal blood glucose levels increased significantly after hemodialysis. This shows that the dialysis process has a positive effect on glucose metabolism by helping to lower blood glucose levels to the normal range.

Based on the research results, 31 respondents (47.7%) were still in the moderate blood glucose level category after undergoing hemodialysis therapy. This finding shows that almost half of the patients still had blood glucose levels above the normal limit even though they had undergone hemodialysis therapy.

Clinically, moderate blood glucose levels describe a condition of impaired glucose regulation or prediabetes, in which blood glucose levels have not yet reached the criteria for severe hyperglycemia, but already show insulin resistance or a decrease in the body's ability to control glucose levels.

According to the American Diabetes Association (2022), this condition is a transitional phase that is at risk of developing into diabetes mellitus if not managed properly. Moderate blood glucose levels reflect mild hyperglycemia, which is generally associated with insulin resistance or glucose metabolism disorders. In patients with chronic kidney disease, this condition is often encountered due to complex changes in insulin metabolism.

Physiologically, hemodialysis can lower blood glucose levels through diffusion and reduction of uremic toxins. However, in some patients, this effect is not sufficient to completely normalize blood glucose levels. This is due to persistent insulin resistance, chronic inflammation, and hormonal disorders that often occur in patients with chronic kidney failure. Thomas (2020) states that although hemodialysis can improve insulin sensitivity, the improvement is partial and varies between individuals.

The results of this study are in line with the research by Rahayu and Siregar (2023), which found that most hemodialysis patients still had moderate glucose levels after dialysis. The study mentioned that this condition is related to persistent insulin resistance even though uremic toxins have decreased after hemodialysis. In addition, hormonal fluctuations and chronic inflammation in kidney failure patients also play a role in maintaining glucose levels at a moderate level. A study conducted by Pratiwi (2022) also found that most chronic kidney failure patients remained in the moderate blood glucose category after hemodialysis. The study explained that factors such as the duration of diabetes mellitus, dietary non-compliance, and chronic metabolic disorders contributed to blood glucose levels that had not returned to normal after dialysis.

The results of the study also showed that only 1 respondent (1.5%) was in the low blood glucose category after undergoing hemodialysis therapy. This figure is the lowest percentage compared to the normal and high categories. These findings illustrate that most patients experience significant changes in blood glucose levels after hemodialysis, either towards the normal category or remaining or decreasing to the low category.

The small percentage in the low category indicates a shift in blood glucose levels after hemodialysis, where patients who were initially in the moderate category are likely to experience a decrease to the normal category or, conversely, an increase to the high category. This is in line with Nasution's (2021) statement that the hemodialysis process can cause significant fluctuations in blood glucose depending on the patient's metabolic condition, the type of dialysate used, and the patient's diabetes control.

Hemodialysis can affect glucose levels through diffusion and ultrafiltration mechanisms. If the dialysate used does not contain glucose, blood glucose levels may decrease due to the transfer of glucose to the dialysate fluid. Conversely, the use of glucose dialysate can increase blood glucose levels during the procedure (Rahman et al., 2022). This may explain why only a few patients remain in the moderate category after therapy.

The researchers assume that these findings have positive implications for clinical management, where hemodialysis not only plays a role in improving kidney filtration function but also helps patients achieve glycemic stability. However, this condition still requires close monitoring to avoid the risk of hypoglycemia, especially in patients with diabetes mellitus who use insulin or oral antidiabetic drugs.

The Effect of Hemodialysis Therapy on the Reduction of Blood Glucose Levels in Patients in the Hemodialysis Room of Prof. Dr. H. Aloei Saboe Regional General Hospital, Gorontalo City

Based on the results of the study, there was a significant change in blood glucose levels before and after hemodialysis therapy in patients undergoing treatment in the Hemodialysis Room at Prof. Dr. H. Aloei Saboe Regional General Hospital in Gorontalo City. The average blood glucose level before hemodialysis was 144.52 mg/dL and decreased to 112.92 mg/dL after hemodialysis. Furthermore, based on the results of statistical analysis using the Wilcoxon test, a p-value of $0.000 < 0.05$ was obtained, indicating that hemodialysis therapy has an effect on lowering blood glucose levels in patients in the hemodialysis room at Prof. Dr. H. Aloei Saboe Regional General Hospital in Gorontalo City.

The study results showed that the average blood glucose level before hemodialysis therapy was 144. 52 mg/dL, with a minimum value of 78 mg/dL and a maximum value of 530 mg/dL. This is because most respondents had blood glucose levels in the moderate range of 111-180 mg/dL, and a small number had levels in the high range of >180 mg/dL, resulting in an average blood glucose level of 144.52 mg/dL.

Theoretically, moderate blood glucose levels describe a condition of mild hyperglycemia, which is generally caused by insulin resistance. In patients with chronic kidney disease, insulin resistance often occurs due to the accumulation of uremic toxins, chronic inflammation, and hormonal disorders. Hemodialysis plays a role in reducing these uremic toxins so that insulin sensitivity can increase and glucose utilization by body tissues becomes more effective (Thomas, 2020). In addition, during the hemodialysis process, a diffusion mechanism occurs, in which glucose moves from the blood to the dialysate fluid following the concentration gradient. This mechanism contributes to a decrease in blood glucose levels, especially in patients with moderate to high glucose levels prior to dialysis. However, in some patients, persistent insulin resistance and the use of dialysate fluid containing glucose prevent blood glucose levels from returning to normal, leaving them in the moderate range after hemodialysis (Kaviani et al., 2020).

This decrease can be explained by the physiological mechanism of hemodialysis therapy, which works on the principles of diffusion, ultrafiltration, and osmosis, whereby metabolic waste products, including glucose, move from the blood into the dialysis fluid. According to Romero et al. (2020), glucose can be dialyzed through a semipermeable membrane during the hemodialysis process, especially when the dialysate fluid does not contain glucose.

Improved metabolism after hemodialysis also contributes to a decrease in blood glucose levels. Hemodialysis can reduce the burden of uremic toxins that previously interfered with insulin sensitivity. After dialysis, the cellular response to insulin improves, allowing blood glucose levels to be controlled more effectively (Mailloux & Bell, 2021). This is supported by research findings showing that the average blood glucose level after hemodialysis therapy is 112. 92 mg/dL, with a minimum value of 69 mg/dL and a maximum value of 178 mg/dL. This is because most respondents had blood glucose levels in the normal range of 70-110 mg/dL, and a small number had levels in the low range of <70 mg/dL, resulting in an average blood glucose level of 112.92 mg/dL.

This is supported by the results of a study conducted by Rahayu and Siregar (2023), which found a significant decrease in blood glucose levels after hemodialysis, especially in patients with moderate blood glucose levels before dialysis. The study explains that this decrease occurs due to the diffusion of glucose into the dialysate fluid and improved insulin sensitivity after the removal of uremic toxins. This is also reinforced by Pratiwi (2022), who reported a significant relationship between hemodialysis procedures and a decrease in blood glucose levels in patients with chronic kidney failure.

Although there was an average decrease, the results of the study still showed variation between patients. The maximum glucose level after hemodialysis still reached 178 mg/dL, indicating that not all patients experienced a significant decrease. Overall, the results of this study indicate that hemodialysis therapy has a significant effect on lowering blood glucose levels, although its effectiveness may vary between individuals. This implies that regular monitoring of glucose levels is necessary during each hemodialysis session to prevent hypoglycemia and hyperglycemia, especially in patients with diabetes mellitus.

CONCLUSION

The results of the study showed blood glucose levels before hemodialysis therapy. Most respondents had moderate blood glucose levels within the range, and a small number had high blood glucose levels.

The results of the study showed blood glucose levels after hemodialysis therapy. Most respondents had normal blood glucose levels, and a small number had low blood glucose levels.

The research results obtained a p-value (0.000) < 0.05, which means that hemodialysis therapy has an effect on lowering blood glucose levels in patients in the hemodialysis room at Prof. Dr. H. Aloei Saboe Regional General Hospital in Gorontalo City.

RECOMMENDATIONS

It is hoped that the results of this study can provide positive results in improving the quality of nursing care for patients undergoing hemodialysis therapy to measure blood glucose levels.

It is hoped that the results of this study will serve as additional information in the learning process and increase scientific knowledge regarding nursing interventions in the form of blood glucose level measurements in patients who will undergo hemodialysis therapy in the hemodialysis room.

It is hoped that the results of this study can serve as a basis for future researchers in conducting research on nursing interventions to monitor blood glucose levels in hemodialysis patients.

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