SUMEJ
Sumatera Medical Journal
Journal homepage: https://talenta.usu.ac.id/smj

Research Article

Relationship Between Nutritional Status and Hemodialysis Therapy in Patients With Chronic Kidney Disease at Adam Malik Medan Hospital, Indonesia

Muhammad Siddik Nasution[*1], Sumi Ramadani[2], Edy Ardiansyah[3], Deryne Anggia Paramita[4]
[1]*Undergraduate Program of Medicine, Faculty of Medicine, Universitas Sumatera Utara, Medan, 20155, Indonesia*
[2]*Department of Internal Medicine, Faculty of Medicine, Universitas Sumatera Utara, Medan, 20155, Indonesia*
[3]*Department of Obstetrics and Gynecology, Faculty of Medicine, Universitas Sumatera Utara, Medan, 20155, Indonesia*
[4]*Department of Dermatology and Venereology, Faculty of Medicine, Universitas Sumatera Utara, Medan, 20155, Indonesia*
[*]Corresponding Author: nstsiddik1@gmail.com

ARTICLE INFO
Article history:
Received 03 December 2024
Revised 03 April 2025
Accepted 03 April 2025
Available online 01 May 2025

E-ISSN: 2622-1357
P-ISSN: 2622-9234

How to cite:
Muhammad Siddik Nasution, Sumi Ramadani, Edy Ardiansyah, Deryne Anggia Paramita, "Relationship Between Nutritional Status and Hemodialysis Therapy in Patients With Chronic Kidney Disease at Adam Malik Medan Hospital, Indonesia", SUMEJ, Vol. 08, No. 02, May 2025.

http://doi.org/10.32734/sumej.v8i2.19070.

ABSTRACT
Background: One of the measures taken to control chronic kidney failure is through the hemodialysis procedure. Hemodialysis therapy can cause various side effects in patients, one of which is the risk of decreased nutritional status which can result in malnutrition. When the nutritional status of kidney failure patients worsens, the quality of life also decreases. **Objective:** This study aimed to determine the relationship between nutritional status and hemodialysis therapy at Haji Adam Malik General Hospital, Medan. **Methods:** This research was conducted from February to October 2024. This research is an analytical observational study using a cross sectional study design. The sample taken in this study was 80. Data was obtained from medical records at H. Adam Malik General Hospital, Medan. **Results:** The correlation test with the Chi-square test showed no relationship between Body Mass Index and several criteria, namely: Gender (p=0.645), age (p=0.410), creatinine (p=0.296), urea (p=0.296), albumin (p=0.315). **Conclusion:** There is no relationship between BMI and age, gender, albumin levels, creatinine levels and albumin levels in hemodialysis patients at H.Adam Malik General Hospital, Medan. The majority of patients undergoing hemodialysis at H.Adam Malik General Hospital Medan have a normal BMI (66%).

Keywords: body mass index, hemodialysis, nutritional status

1. Introduction

Chronic renal failure (CKD) is defined as a state of kidney function gradually worsens and cannot be recovered,causing the body to not can maintain metabolism and fluid and electrolyte balance, soresulting in increased urea levels [1]. Purposeful therapy to support their lives is necessary for people with kidney failure chronic [2]. One of the actions taken to control chronic kidney failure is through a hemodialysis procedure, which aims to replace function kidney disease, increasing life expectancy and quality of life in kidney failure patients [1]. The main cause of chronic kidney failure in Indonesia is hypertension, which contributes 34% of

cases, followed by diabetes mellitus with 27%, glomerulonephritis with 14%, obstructive nephropathy with 8%, chronic pyelonephritis with 6%, polycystic kidney with 1%, and other factors that reach 10% [3].

Chronic kidney disease causes irreversible loss of nephrons due to chronic injury. The amount of work to be done by the remaining nephrons will be doubled. The body compensates by enlarging Structurally and functionally, the remaining nephrons are linked to vasoactive molecules such as cytokines and growth factors. This causes compensatory hyperfiltration, or "hypertension" at the nephron level. Increased capillary pressure and glomerular blood flow occur in a state of compensatory hyperfiltration. The body's adaptation is a short process, but can lead to renal fibrosis if done continuously. Renal fibrosis is an unsuccessful wound healing in renal tissue after prolonged severe injury and is found to have glomerulosclerosis, tubular atrophy and interstitial fibrosis. tubular atrophy, and interstitial fibrosis [4].

Hemodialysis (HD) therapy can prolong a person's life without a clear period of time. However, it does not improve the normal development of primary kidney disease, and does not restore all kidney functions. Patients will face many difficulties and complications due to their condition. Hemodialysis will also affect the patient's mental, social, and economic health. Patients may face problems interacting socially and cognitive disorders. In addition, they may face problems such as loss of career, changes in family roles, changes in social relationships, time, and costs required to undergo regular hemodialysis. All of these factors will cause a decrease in the quality of life for individuals with chronic kidney failure who are treated with HD [2]. Hemodialysis is a renal therapy that uses a semi-permeable membrane. membrane, also known as a dialyzer. This membrane has the ability to remove metabolic waste and improve the fluid and electrolyte balance of patients with kidney failure [5].

Based on information collected by the national government, approximately 713,783 people have CKD, and 2,850 of them have received treatment for hemodialysis. treatment for hemodialysis. With a total of 355,726 men and 358,057 women, the number of chronic kidney failure patients in North Sumatra is 45,792 cases, with 131,846 cases in West Java, 113,045 cases in Central Java, and 45,792 cases in Central Java [6].

According to the Global Burden of Disease Study (2017), CKD is predicted to be the 5th leading cause of premature death in 2040, a significant increase from 16th in 2016. Based on Riskesdas 2018, the prevalence of CKD increased by 1.8% from 2013 (2.0%) to 3.8% in 2018, and this increase occurred in all regions of Indonesia except East Java and West Sulawesi. DKI Jakarta recorded the highest prevalence of CKD sufferers undergoing hemodialysis, reaching 38.7% of the total in Indonesia [7].

Hemodialysis therapy can cause various side effects in patients, one of which is the risk of decreased nutritional status which can lead to malnutrition. Malnutrition for individuals suffering from chronic kidney failure (CKF) is a condition in which there is a loss of energy and protein, resulting in loss of muscle mass. According to a study conducted by Djafar & Sulistyowati (2016), as many as 62.2% (23 people) of CKF patients undergoing hemodialysis experienced protein intake deficiency, while 37.8% (14 people) of them had adequate protein intake. No respondents were reported to have excessive protein intake [8].

The causes of malnutrition in individuals with kidney disease and undergoing hemodialysis are complex, including inadequate food intake, loss of nutrients through dialysis fluid, chronic inflammation, increased catabolism, and catabolic stimulation from the body of the patient undergoing hemodialysis itself. As the nutritional status of patients with kidney failure worsens, their quality of life also decreases [9]. Routine examination of the nutritional status of hemodialysis patients is essential to identify malnutrition, which can increase the risk of disease and death. To perform this procedure, people with chronic kidney failure who undergo hemodialysis must undergo nutritional screening to monitor their nutritional condition. Various methods, such as anthropometric measurements, assessment of food intake history, and testing of biochemical parameters, can be used to monitor the nutritional status of patients undergoing hemodialysis. In addition, special forms can be used to do [10]. This study was conducted to determine the relationship between nutritional status and hemodialysis therapy at Adam Malik Hospital Medan Indonesia and this study looked at the state of nutritional status based on BMI and biochemical parameters (ureum, creatinine, albumin) of hemodialysis patients.

Decreased nutritional status is caused by decreased appetite, decreased appetite in CKD patients is caused by many factors, including uremia syndrome which causes patients to experience nausea, vomiting, and loss of taste buds. This facilitates chronic inflammation and comorbidities due to protein energy malnutrition [11].

2. Methods

This study was an observational analytic study with a cross-sectional design aimed at examining the relationship between nutritional status and hemodialysis therapy at RSUP Haji Adam Malik Medan in 2023. The study focused on parameters such as body mass index (BMI), urea levels, creatinine levels, and albumin

levels. Data were collected from the medical records of patients meeting the inclusion criteria, specifically those diagnosed with chronic kidney disease undergoing hemodialysis therapy at the hospital.

A minimum sample size of 80 was determined using Slovin's formula, with a 10% margin of error from a total population of 359 patients identified in 2023. Patients were selected using a simple random sampling technique. Ethical clearance was obtained from RSUP Haji Adam Malik Medan, and secondary data were extracted from the hospital's medical record department to ensure comprehensive and accurate information.

3. Results

This research was conducted according to the planned schedule, and the data analysis yielded the following results: the findings indicate the characteristics of the research subjects (Tab 1).

Table 1. Characteristics Data for Hemodialysis (HD) Patients at RSUP Haji Adam Malik

variable	frequency	n%
Gender		
Male	45	56,3
Female	35	43,8
Age		
Young	43	53,8
Old	37	46,3
Body Mass Index (BMI)		
Overweight	14	17,5
Underweight	18	22,5
Normal	48	66,0
Urea status		
Normal	4	5,0
Low	1	1,3
High	75	93,8
Creatinine status		
Normal	4	5,0
High	76	95,0
Albumin status		
Normal	38	47,5
Low	40	50,0
High	2	2,5

Based on Table 1, The majority of patients undergoing hemodialysis (HD) were male, accounting for 56%. The most common age group undergoing HD was younger patients (<50 years), making up 53.8%. In terms of BMI, patients with a normal BMI were more prevalent (66%) compared to those with overweight BMI (17.5%) and underweight BMI (22.5%).

Patients with high urea levels (93.8%) were more prevalent compared to those with normal urea levels (5.0%) and low urea levels (1.3%). Creatinine levels indicated that the majority of patients had high creatinine levels (95.0%). Meanwhile, for albumin levels, patients with low albumin levels (50%) were more common compared to those with normal albumin levels (47.5%) and high albumin levels (2.5%).

Table 2. BMI correlation with urea status

Variable	Total	Normal	Not normal	*p value*
Urea	80			
Normal	4	1	3	0.296
Not normal	76	47	29	

Signs of CKD include albuminuria, abnormal urine sediment, electrolytes, histology, structure, or kidney transplantation. electrolytes, histology, structure, or having had a kidney transplant, as well as a decreased glomerular filtration rate [12]. and the severity of renal impairment can be assessed by the patient's albumin level where albumin <30 is a normal or reduced level, and albumin levels of 30-300 indicate moderately elevated levels, and very high levels are said if the albumin level is >300 [13].

Based on table 2, This study shows that urea levels in patients do not have a significant relationship with nutritional status (p=0.296). This is consistent with the study conducted by Suzuki et al., where no relationship was found between urea levels and body mass index (BMI) in hemodialysis patients (p=0.20) [14].

Table 3. BMI correlation with creatinine status

Variable	Total	Normal	Not normal	*p value*
Kreatinin	80			
Normal	4	1	3	0.296
Not normal	76	47	29	

Based on table 3, This study also shows that creatinine levels in patients do not have a significant relationship with nutritional status (p=0.296). This is consistent with the study by Zoccali et al., where no studies have shown a relationship between body mass index (BMI) and serum creatinine levels. The study also found no relationship between BMI and serum creatinine levels in men aged 40 years and older [15].

Table 4. BMI correlation with albumin status

Variable	Total	Normal	Not normal	*p value*
Albumin	80			
Normal	38	25	13	0.315
Not normal	42	23	19	

Based on table 4, It shows that albumin levels in patients undergoing hemodialysis do not have a significant relationship with nutritional status (p=0.315). This result is in line with a study conducted by Ghani et al. at RSUD Ulin Banjarmasin, where a similar finding was observed (p=0.7) [16].

4. Discussion

The lack of relationship between urea, creatinine, and albumin levels and body mass index (BMI) in hemodialysis patients could be attributed to several factors, such as a good quality of life, balanced hormone levels, and adequate nutrition, including sufficient food and vitamins. When nutritional intake is well distributed and sufficient, it ensures an adequate supply of amino acids needed for muscle protein synthesis [16].

Several factors associated with poor nutritional status in hemodialysis (HD) patients include loss of appetite, strict dietary restrictions that can lead to Protein Energy Wasting (PEW), hypermetabolism, decreased physical activity, metabolic acidosis, and the presence of comorbidities that contribute to the condition [17]. Some of the factors associated with poor nutritional status in hemodialysis (HD) patients include loss of appetite, strict dietary restrictions that can lead to Protein Energy Wasting (PEW), hypermetabolism, decreased physical activity, metabolic acidosis, and the presence of comorbidities that contribute to the condition According to the International Society of Renal Nutrition and Metabolism (ISRNM), there are four parameters used to evaluate the nutritional status of HD patients. (ISRNM), there are four parameters that are used to evaluate the nutritional status of nutritional status of patients undergoing hemodialysis (HD): (1) Evaluation of blood chemistry parameters such as serum albumin and cholesterol. (2) Measurement of body mass through

BMI and total body fat percentage (BF%). (3) Assessment of muscle mass by looking at creatinine levels and midarm muscle circumference (MMC).(4) Evaluation of dietary intake based on protein or energy consumption. Of all these parameters, assessment using BMI is considered to be a an easy and practical method to evaluate the nutritional status of HD patients [18].

5. Conclusion

Based on the data analysis and discussion of the research, it can be concluded that the BMI of patients undergoing hemodialysis does not have a relationship with urea levels, creatinine levels, or albumin levels. And Based on the data analysis and discussion of the research, it can be concluded that the BMI of patients undergoing hemodialysis does not have a relationship with urea levels, creatinine levels, or albumin levels. Additionally, the majority of hemodialysis patients at RSUP Haji Adam Malik Medan have a normal BMI, accounting for 60%.

6. Data Availability Statement

The datasets generated and analyzed during the current study are not publicly available due to privacy and ethical considerations but are available from the corresponding author upon reasonable request.

7. Ethical Statement

This study was approved by the Health Research Ethics Committee of Universitas Sumatera Utara (No: 710/KEPK/USU/2024) and conducted in accordance with the Nuremberg Code and the Declaration of Helsinki.

8. Author Contributions

All authors contributed to the design and implementation of the research, data analysis, and finalizing the manuscript.

9. Funding

This research did not receive any external funding.

10. Acknowledgements

The authors would like to express their gratitude to RSUP Haji Adam Malik Medan and the hospital's Medical Record Department for their support and permission to access patient data. Their assistance greatly contributed to the successful completion of this study.

11. Conflict of Interest

Authors declares no conflict of interest.

References

[1] Putri E, Alina, Indrawati. JURNAL NERS Research & Learning in Nursing Science. J NERS Res Learn Nurs Sci. 2020;4(23):47–55.
[2] Purwati H, Wahyuni S. Hubungan antara lama menjalani hemodialisis dengan hidup pasien gagal ginjal kronik di RS Gatoel Mojokerto. 2020.
[3] Vaidya SR, Aeddula NR. Chronic Kidney Disease. 2024:1–15.
[4] Anggraini D. Aspek klinis dan pemeriksaan laboratorium penyakit ginjal kronik. 2022;9(2).
[5] Hutagaol EV. Peningkatan kualitas hidup pada penderita gagal ginjal kronik yang menjalani terapi hemodialisis melalui psychological intervention di Unit Hemodialisa RS Royal Prima Medan tahun 2016. 2017;2:1–211. Available from: https://doi.org/10.1080/13507486.2015.1047603.
[6] Syahputra E, Laoli EK, Alyah J, Bahagia EY, Tumorang EYEB, Nababab T. Dukungan keluarga berhubungan dengan kualitas hidup pasien gagal ginjal kronik yang menjalani terapi hemodialisa. 2022;4:793–800.
[7] Ekaputri GJ, Khasanah TA. Hubungan asupan energi dan protein terhadap status gizi pasien penyakit ginjal kronik dengan hemodialisa. 2018;2(2):16–23.
[8] Zulfikar AN, Koerniawati RD, Perdana F. The association between macronutrients intake on nutritional status. J Gizi Kerja Produktiv. 2023;4(2):225–34.
[9] Putu N, et al. Hubungan adekuasi hemodialisis dan status gizi dengan kualitas hidup pasien gagal ginjal kronik yang menjalani hemodialisis di RSUP Sanglah Denpasar. 2023;12:156–64.

[10] Hayati DM, Widiany FL, Nofiartika F. Status gizi berdasarkan dialysis malnutrition score (DMS) dengan kualitas hidup pasien hemodialisis. Indones J Clin Nutr. 2021;18(1):28–37. Available from: https://doi.org/10.22146/ijcn.60778.
[11] Satti YC, Mistika SR, Imelda L. Faktor-faktor yang mempengaruhi status gizi pasien hemodialisa di Rumah Sakit Stella Maris Makassar. J Keperawatan Florence Nightingale. 2021;4(1):1–8. Available from: https://doi.org/10.52774/jkfn.v4i1.54
[12] isara S, Azmi S, Yanni M. Gambaran klinis penderita penyakit ginjal kronik. 201 5;7(1):42–50.
[13] Ammirati AL. Chronic Kidney Disease. 2020;66(Suppl 1).
[14] Suzuki Y, et al. Trajectory of lean body mass assessed using the modified creatinine index and mortality in hemodialysis patients. Am J Kidney Dis. 2020;75(2):195–203. Available from: https://doi.org/10.1053/j.ajkd.2019.05.034.
[15] Yohan HOP, Waleleng BJ, Wantania F. Hubungan antara indeks massa tubuh dengan estimasi laju filtrasi glomerulus pada mahasiswa. 2015.
[16] Ghani NMF, Rudiansyah M, Pratiwi DIN, Zaitun N, Hendriyono FX. Pasien hemodialisis rutin di RSUD Ulin Banjarmasin. 2022:519–22.
[17] Utami AS, Asmara IGY, Irawati D. Hubungan adekuasi hemodialisis dengan status gizi pasien penyakit ginjal kronik yang menjalani hemodialisis di RS Kota Mataram. J Kedokteran Umum. 2021;10(3):502–8. Available from: http://repository.uhn.ac.id/handle/123456789/1364.
[18] Subhan TA. Perbedaan indeks massa tubuh (IMT) pada pasien gagal ginjal kronik dengan DM dan tanpa DM yang menjalani hemodialisis rutin di RSUD Dr. Moewardi. J Chem Inf Model. 2018;53(9):1689–99.