



ASSESSING THE LINK BETWEEN INTERDIALYTIC WEIGHT GAIN, NUTRITIONAL STATUS, AND QUALITY OF LIFE IN HEMODIALYSIS PATIENTS AT DR. MOHAMMAD HOESIN GENERAL HOSPITAL PALEMBANG

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ABSTRACT

Hemodialysis patients experience changes in all aspects of their life, particularly due to fluid and dietary restrictions. Excessive interdialytic weight gain and malnutrition are common problems that negatively impact the increase of morbidity and mortality in these patients, as well as a decrease in their quality of life. This research aims to determine the relationship between interdialytic weight gain and nutritional status with the quality of life of chronic kidney disease patients undergoing hemodialysis at Dr. Mohammad Hoesin General Hospital Palembang. 102 patients were involved in this cross-sectional study, and they were taken by purposive sampling. IDWG data was collected using The Interdialytic Weight Gain (IDWG) observation sheet, nutritional status was identified using the Dialysis Malnutrition Score (DMS), and quality of life was assessed using The Kidney Disease Quality of Life Short Form-36 (KDQOL-36TM). The data analysis used in this study is Fisher Exact test. Based on The Fisher Exact test, there is a relationship between IDWG and quality of life ($p=0.048$). The results of statistical analysis also showed a relationship between nutritional status and quality of life ($p=0.047$). Most patients had IDWG in the mild category, good nutritional status, and poor quality of life based on KDQOL-36TM. This study concludes a relationship between interdialytic weight gain and nutritional status with the quality of life of patients undergoing hemodialysis. It is recommended that health workers in hemodialysis units monitor interdialysis weight gain regularly and conduct routine nutritional screenings to prevent a decrease in quality of life.

Keywords: interdialytic weight gain, nutritional status, quality of life, hemodialysis patients

Introduction

Chronic Kidney Disease (CKD) is one of the biggest global public health issues. It is a characteristic of this health problem. End-stage renal disease, which necessitates dialysis or a kidney transplant, is caused by a progressive decrease of kidney function.¹ According to the 2017 Global Burden Disease Report, a third of CKD patients reside in China and India, where the frequency ranged from 8.5% to 9.8%.² In addition to those nations, Indonesia also has a high prevalence of chronic kidney disease. The National Basic Health Research (*Riset Kesehatan Dasar* or *Riskesdas*) revealed that the prevalence of CKD (eGFR < 60 ml/min/1.73 m²) was 3.8 permil (‰) in 2018, up from 2.0 permil (‰) in 2013.³ Also, according to the 2018 Indonesia Renal Registry (IRR) data, South Sumatra Province had the seventh-highest number of new patients, with 2333 individuals. This represents a significant increase of 81.6% compared to the 2017 IRR data, which reported 427 patients.⁴

End-stage CKD patients must receive renal replacement therapy immediately. The most widely used renal replacement therapy in Indonesia is hemodialysis, with 98% of the patients using it.⁴ This therapy has a long and expensive activity. The patient who did the treatment had a restriction on food and liquids. Consequently, the patients will end up losing their independence, dependence on looking after their healthcare providers, disruption of marital and personal life; and financial problems will occur. Therefore, both physical and psychological, socio-economic, and environmental aspects will have a negative impact and the patients of chronic renal failure will be affected in their quality of life.⁵

A common problem patients experience is Interdialytic Weight Gain (IDWG). It is defined as hypervolemia (fluid overload in the body), which indicates weight gain throughout the interdialytic phase and reflects patient adherence to fluid control.⁶ Monitoring patients' fluid intake is the main measure that needs to be taken because the increase in IDWG has a detrimental effect; during the interdialytic phase, 60-80% of patients pass away from overeating and drinking. Too much fluid during this time can cause pulmonary edema or congestion. Thus, the most important thing to think about is keeping an eye on the patient's hydration consumption.⁷ A study from Oman revealed that 81% of patients had an IDWG >4% and were hospitalized at least once or required extra hemodialysis (HD) sessions due to fluid overload.⁸ High IDWG is linked to an increased risk of cardiovascular and hemodynamic problems due to excessive ultrafiltration.⁹ Reducing urine production, cramps, exhaustion, lightheadedness, edema, ascites, and dyspnea can be a result of an IDWG rise above 3.5% of dry body weight. These symptoms can significantly impact daily activities and reduce quality of life.¹⁰

Furthermore, the interdisciplinary team that is accompanied by CKD patients during hemodialysis is also concerned about and challenged by their dietary state. In hospitals, malnutrition is common and has negative consequences.¹¹ Malnutrition is a sign of a bad prognosis

in CKD.¹² According to certain studies, malnutrition in hemodialysis patients ranges widely over the world, from less than 10% to more than 90%.¹³ Patients undergoing regular hemodialysis are in danger of malnourishment because of the catabolic impacts of hemodialysis, inadequate food intake due to uremic toxins and food restriction, nutrient loss because of metabolic acidosis, inflammation, and the dialysis membrane. Malnutrition is linked to higher rates of morbidity, reduced functional ability, and more frequent and prolonged hospital stays, which can negatively impact the quality of life.¹⁴

Numerous studies have observed the quality of life of hemodialysis patients. Research conducted in India, Turkey, and the Philippines shows that the quality of life of hemodialysis patients tends to be poor.^{6,15,16} However, the impact of nutritional status and interdialytic weight gain on Indonesian hemodialysis users' quality of life has been extensively studied. This study used different tools to evaluate patients' nutritional condition using a screening form that has been widely used abroad but is still rarely used in Indonesia. Therefore, there is a critical need for further in-depth studies to understand the relationship between interdialytic weight gain, nutritional status, and quality of life in hemodialysis patients. Based on data from Dr. Mohammad Hoesin General Hospital's business strategy plan for 2020-2024, chronic kidney disease is in first place among the most common outpatient diseases in 2015-2018. This study aimed to ascertain the correlation between Interdialytic Weight Gain (IDWG) and nutritional status with quality of life in chronic kidney disease patients receiving hemodialysis at Dr. Mohammad Hoesin General Hospital, Palembang.

Methods

A cross-sectional, quantitative analytical analysis was employed. This investigation was carried out at Dr. Mohammad Hoesin General Hospital Palembang Hemodialysis Installation in June 2023. Purposive sampling based on inclusion and exclusion criteria yielded a sample size of 102 patients, which was determined using two proportion hypothesis test formula. To be eligible to participate in the study, a person had to be at least eighteen years old, undertake routine hemodialysis (HD) twice a week, have been experiencing regular HD for more than six months, and be able to weigh themselves while standing. Exclusion criteria were patients who were unable to answer questions due to psychological or cognitive impairment, missed the hemodialysis schedule; and patients with hepatitis B, hepatitis C, and HIV. Respondent characteristics collected in this study included gender, age, education, employment status, and length of hemodialysis.

Quality of life is the study's dependent variable. Meanwhile, the independent variables were interdialytic weight gain and nutritional status. IDWG calculation is calculated using the following formula:

$$\frac{(\text{pre-dialysis weight}) - (\text{post-dialysis weight (of prior session)})}{\text{pre-dialysis weight}} \times 100\%$$

IDWG classification was separated into three categories: mild (<4%), moderate (4-6%) and severe (>6%).¹⁰ Nutritional status variables were identified using the Dialysis Malnutrition Score (DMS) form. Subjective Global Assessment (SGA), the most popular nutritional status examination technique for CKD patients receiving hemodialysis, served as the model for DMS, a nutritional status assessment tool. The nutritional status examination method using DMS has high sensitivity and specificity values compared to SGA in early detection of nutritional status.¹⁷ A total score of 7 to 35 is obtained by adding the scores of the DMS components; this score is then used to classify the following conditions: good (normal) nutritional status (7-13), mild-to-moderate (score of 14-23), and severe malnutrition (score of 24-35). The Kidney Disease Quality of Life Short Form-36 (KDQoL-36TM) questionnaire, a specific tool for evaluating the quality of life of patients with CKD and dialysis, was used to measure quality of life.¹⁸ This specific tool consists of 36 questions covering five aspects: physical and mental health components, kidney disease symptoms and issues, kidney disease burden, and kidney disease effect. The researchers collected data using a validated and reliable Indonesian version of the questionnaire.¹⁸ The technique of filling out the form is by giving a score to each question. The total score obtained is entered into the point value conversion which is then taken as the average value. The average value has a range between 0-100, where a score of less than or equal to 66.37 is categorized as a good quality of life, and a score of less than 66.37 is categorized as a poor quality of life.

The collected data was analyzed using statistical application. Both univariate and bivariate data analyses were conducted. The univariate analysis in this study is presented as frequency distribution to explain the description of each of the research variables. To ascertain the association between independent and dependent variables at a significance of $p < 0.05$, bivariate data analysis was carried out using Fisher's exact test. Dr. Mohammad Hoesin Palembang Hospital (DP.04.03/D.XVIII.6.11/ETIK/67/2023) and the Research Ethics Committee of the Faculty of Public Health, Sriwijaya University (183/UN9.FKM/TU.KKE/2023) have authorized this study. Prior to taking part in the trial, each participant signed an informed consent form.

Results

In Table 1, the characteristics of the respondents are shown. In this study, there are a total of 102 patients. The distribution based on gender was dominated by females (54.9%). Most of the people who responded were aged 45-54 years old (27.5%), unemployed (76.5%), and had undergone hemodialysis ≥ 1 year (62.7%). Then, it is known that 63 respondents (61.8%) had IDWG in the mild category, 66 respondents (64.7%) had good nutritional status, and 91 respondents (89.2%) had poor quality of life.

Table 1. Characteristics of Respondents

Variable	Frequency (n = 102)	%
Gender		
Male	46	45.1
Female	56	54.9
Age		
25-34 years	15	14.7
35-44 years	15	14.7
45-54 years	28	27.5
55-64 years	23	22.5
≥ 65 years	21	20.6
Education		
Elementary school	19	18.6
Junior high school	16	15.7
Senior high school	37	36.3
College	30	29.4
Employment		
Employed	24	23.5
Unemployed	78	76.5
Length of HD		
< 1 year	38	37.3
≥ 1 year	64	62.7
Interdialytic Weight Gain		
Mild	63	61.8
Moderate	28	27.5
Heavy	11	10.8
Nutritional Status		
Normal	66	64.7
Mild Malnutrition	36	35.3
Severe Malnutrition	0	0
Quality of Life		
Poor	91	89.2
Good	11	10.8

Based on Table 2, it is well known that all respondents (100%) have a low quality of life in the Physical Component Summary domain; almost all respondents have a poor quality of life in the Mental Component Summary domain (98%), and the burden of kidney disease (86.3%); the majority of respondents have a good quality of life in the domain of kidney disease symptoms (66.7%) and the effects of kidney disease (74.5%).

Table 2. Quality of Life Based on Domain

Domain	Frequency (n = 102)	%
Physical Component Summary (PCS)		
Poor	102	100
Good	0	0
Mental Component Summary (MCS)		
Poor	100	98
Good	2	2
Burden of Kidney Disease		
Poor	88	86.3
Good	14	13.7
Symptoms/problems		
Poor	34	33.3
Good	68	66.7
Effect of kidney disease		
Poor	26	25.5
Good	76	74.5

The findings of the bivariate study of the relationship between interdialytic weight gain and nutritional status with quality of life are displayed in Table 3. Most individuals with CKD patients have poor quality of life and moderate to heavy interdialytic weight gain (97.4%). Only a small percentage of subjects had moderate to heavy IDWG with a good quality of life (2.6%). The majority of CKD patients have nutritional status in the mild malnutrition category with poor quality of life (97.4%). Only 1 (one) respondent had a nutritional status in the mild malnutrition category with a good quality of life (2.6%). Fisher’s exact analysis of the interdialytic weight gain shows a p-value of 0.048 (Prevalence Ratio or PR = 1.158; 95% CI = 1.029 – 1.304) showing a significant relationship with quality of life. The results obtained a PR value of 1,158 means that patients with moderate-severe IDWG have a 1.158 times greater risk of getting a low quality of life. The results of the analysis of nutritional status and quality of life also showed a significant relationship with a p-value of 0.047 (PR = 1.162; 95% CI = 1.031-1.311). The results of a PR value of 1.162 mean that patients with malnutrition have 1.162 times more chance of having a poor quality of life.

Table 3. Analysis of Relationship between Interdialytic Weight Gain and Nutritional Status with Quality of Life

Variable	Quality of Life				Total n	p-value	PR 95% CI
	Poor		Good				
	n	%	n	%			
Interdialytic Weight Gain (IDWG)							1.158 (1.029 – 1.304)
Moderate - Heavy	38	97.4	1	2.6	39	0.048	
Mild	53	84.1	10	15.9	63		
Nutritional Status							1.162 (1.031 – 1.311)
Mild Malnutrition	38	97.4	1	2.6	39	0.047	
Good	53	84.1	10	15.9	63		

Discussion

Chronic Kidney Disease is a chronic illness that substantially lowers a patient’s quality of life by interfering several parts of their life.¹⁹ Numerous internal and external variables contribute to these shifts.¹⁹ It is crucial to assess the quality of life of patients with chronic illnesses, particularly chronic kidney disease, as low quality of life can impact disease outcomes and raise the risk of morbidity and death.

The analysis gave a result that indicated a strong correlation between hemodialysis patient’s quality of life and interdialytic weight gain. Previous studies found a correlation between interdialytic weight gain and quality of life, especially in mental and physical domains.²⁰ A study conducted in India also found that people with greater IDWG had lower quality of life scores. Additionally, this study found that IDWG significantly affects quality of life.¹⁵ The research conducted in Turkey also reported that high IDWG harms the domains of quality of life, namely vitality, social function, and increased incidence of depression.²¹

IDWG or an increase in fluid volume accompanied by an increase in body weight, determines the amount of fluid consumed during the interdialytic interval. In absolute terms, IDWG shouldn't be more than 2 to 2.5 kg or 4 to 4.5% of dry weight.²¹ In this study, patients with moderate-heavy IDWG were more frequent in female patients and productive age. It contrasts with the findings of other research, which found that IDWG values were lower in female patients.^{10,12} Women have a greater chance of not adhering to fluid restriction because women have the hormones estradiol and progesterone, which significantly affect body fluid and sodium regulation, especially in osmotic regulation, which increases thirst and hypertonic stimulation of body fluids. In addition, women have a menstrual cycle that requires more fluid from outside the body to balance it.²² Younger patients have higher IDWG due to their higher metabolic activity and propensity for consuming large amounts of food and water.¹²

There have been negative clinical outcomes associated with excessive IDWG, such as hypotension, hypertension, muscle cramps, asphyxia, nausea, and vomiting.²⁰ Hemodynamic instability and increased rates of morbidity and mortality are associated with higher IDWG, which indicates a higher rate of fluid evacuation (ultrafiltration) during dialysis.⁸ From this explanation, it can be seen that the negative impact of increased IDWG affects the quality of life of patients. This affects patients with HD physical domain because of their greater reliance on medical assistance, the frequency of HD episodes, ongoing pain and suffering, sleep disturbances, and immobility, all of which lower their quality of life.²³ Increased IDWG also causes changes in the capacity to carry out everyday tasks so it negatively affects the psychological domain. The psychological effects of physical constraints on patients include stress and depression, which are made worse by problems with body image and affect the patient's social life.²⁴ Further studies have also shown that patients are more likely to experience adverse mental health consequences, such as emotions of dread, despair, and dissatisfaction.²⁵ The study's findings also demonstrated that, in terms of the burden of kidney disease, most of the patient's quality of life was poor. Patients are dissatisfied with how kidney illness affects their everyday lives, including limitations on their capacity to travel, work, and consume fluids and food, as well as their need for dialysis treatments. Patients believe that their sickness burdens them, interferes with their everyday lives, is irritating, and takes up more time.²⁵

The analysis also showed a correlation between nutritional status and quality of life in hemodialysis patients. These results are the same as research conducted at the Chinese General Hospital and Medical Center which patients with higher DMS scores are related to an elevated danger of hypoglycemia and reduction in quality of life.¹⁶ A study in Spanish stated malnutrition was one of the main elements influencing life quality.¹⁴ Patients doing regular hemodialysis are at risk for worsening nutritional status, leading to malnutrition. Early detection and treatment of malnutrition are crucial since it is linked to worsening illness conditions, poor wound healing,

depression, increased risk of infection, higher rates of morbidity, mortality, and hospitalization, as well as a tendency toward hypoglycemia.¹⁶

The majority of hemodialysis patients with mild malnutrition had poor quality of life (97.4%). This demonstrates how starvation lowers hemodialysis patient's quality of life. Patients who have a slight case of malnutrition experience mild weight loss, decreased functional capacity such as walking and stair climbing, and decreased food intake. Inadequate food intake is due to a monotonous diet or lack of variety in food groups, poor food quality, anorexia, and taste changes such as increased metallic taste when consuming foods high in protein, like beef. Comorbidities related to CKD negatively affect the physical function component. One of the main reasons HD patients have a diminished physical ability to carry out everyday tasks is fatigue, which also plays a role in malnutrition.²⁶ The hemodialysis process also contributes to malnutrition as it causes protein and amino acid depletion and an increase in protein catabolism.²⁷

Patients with HD frequently suffer from malnutrition and a reduced quality of life. Malnutrition in patients with CKD is caused by the early progression of the disease itself, the use of a low-protein diet to halt its progression, and the potentially life-saving dialysis treatment time for those who develop CKD. One of the strictest diets is the dialysis diet, which can be frustrating, and burdensome, and results in less-than-ideal adherence to treatment, which lowers patient satisfaction and quality of life.²⁸ Dialysis patients who are malnourished have worse quality of life, greater morbidity, and more functional impairment; therefore it is important to monitor and enhance their nutritional status.¹² Protein Energi Wasting (PEW) syndrome, which results from malnutrition, is characterized by the depletion of energy stores and a decrease in muscle mass. It can make it not easy to carry out daily tasks and may also make a person less strong and independent, which can lower their quality of life.¹⁸ According to this study, 84.1% of hemodialysis patients with good nutritional status had a poor quality of life. This condition may be due to other influencing factors such as fatigue, functional status, general health perception, depression, and anxiety.⁶ These findings can guide the development of monitoring system to assess interdialytic body weight, nutritional status, and quality of life on a regular basis in hemodialysis installation. The limitation of this study is that researchers only assessed nutritional status using the DMS form and did not use other parameters such as anthropometry, biochemistry, and dietary.

Conclusion

The quality of life of patients with CKD receiving hemodialysis at Dr. Mohammad Hoesin General Hospital Palembang is significantly correlated with their interdialytic weight growth and nutritional status. It is recommended that health workers (e.g., doctors, nurses, and nutritionists) consider these findings to conduct regular interdialysis weight monitoring to evaluate patient's

fluid intake. Furthermore, to encourage early nutritional intervention and stop declines in nutritional status and quality of life, routine nutritional screening should be carried out.

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Conflict of Interest

The authors declare they have no conflicting interests.

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