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Correlation between Dialysis Malnutrition Score (DMS) and Quality of Life Based on Kidney Disease Quality of Life Short Form 36 (KDQOL-SF36) in Patients with Stage 5 Chronic Kidney Disease Undergoing Hemodialysis at the Hemodialysis Unit of RSUD Negara, Jembrana, Bali in 2025

Correlação entre a Pontuação de Desnutrição na Hemodiálise (DMS) e a Qualidade de Vida com Base no Questionário Kidney Disease Quality of Life Short Form 36 (KDQOL-SF36) em Pacientes com Doença Renal Crônica em Estágio 5 em Hemodiálise na Unidade de Hemodiálise do RSUD Negara, Jembrana, Bali, em 2025

Correlación entre la Puntuación de Desnutrición en Hemodiálisis (DMS) y la Calidad de Vida según el Cuestionario Kidney Disease Quality of Life Short Form 36 (KDQOL-SF36) en Pacientes en Enfermedad Renal Crónica en Estadio 5 en Tratamiento en Hemodiálisis en la Unidad de Hemodiálisis del RSUD Negara, Jembrana, Bali en 2025

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Abstract
Introduction: Quality of life is one of the main expected outcomes in patients with chronic kidney disease (CKD) stage 5 undergoing hemodialysis. Objective: To determine the correlation between DMS and quality of life based on KDQOL-SF36 in patients with CKD stage 5 undergoing hemodialysis at the Hemodialysis Unit of RSUD Negara, Jembrana, Bali. Methods: The study was conducted between April 7 and April 30, 2025, at the Hemodialysis Unit of RSUD Negara, Jembrana, Bali. A total of 105 patients with CKD stage 5 undergoing hemodialysis from 2015 to April 2025 participated in the study. Nutritional status was assessed using DMS, while quality of life was measured using the KDQOL-SF36 questionnaire. Results: Spearman's correlation test showed a statistically significant correlation between DMS and quality of life based on KDQOL-SF36 ($p < 0.001$), with a Spearman's correlation coefficient (r) of -0.592, indicating a moderate negative correlation. The negative direction of the correlation suggests an inverse relationship: the higher the DMS score, the lower the KDQOL-SF36 score, and vice versa. Most participants had good nutritional status based on DMS and reported good quality of life based on KDQOL-SF36. Conclusion: There is a statistically significant correlation between Dialysis Malnutrition Score and quality of life based on KDQOL-SF36 in patients with stage 5 CKD undergoing hemodialysis at the Hemodialysis Unit of RSUD Negara, Jembrana, Bali.
Keywords: Chronic Kidney Disease (CKD); Dialysis Malnutrition Score (DMS); Kidney Disease Quality of Life (KDQOL)-SF36; Hemodialysis; Quality of Life.

Resumo
Introdução: A qualidade de vida é um dos principais desfechos esperados em pacientes com Doença Renal Crônica (DRC) em estágio 5 que realizam hemodiálise. Objetivo: Determinar a correlação entre o DMS e a qualidade de vida com base no KDQOL-SF36 em pacientes com DRC estágio 5 em hemodiálise na Unidade de Hemodiálise do RSUD Negara, Jembrana, Bali. Métodos: O delineamento observacional transversal e foi realizado entre 7 e 30 de abril de 2025, na Unidade de Hemodiálise do RSUD Negara, Jembrana, Bali. Participaram 105 pacientes com DRC em estágio 5 que realizavam hemodiálise desde 2015 até abril de 2025. Avaliou-se o estado nutricional usando o DMS, enquanto a qualidade de vida foi mensurada através de questionário KDQOL-SF36. Resultados: O teste de correlação de Spearman revelou uma correlação estatisticamente significativa entre o DMS e a qualidade de vida com base no KDQOL-SF36 ($p < 0,001$), com um coeficiente de correlação de Spearman (r) de -0,592, indicando uma correlação

negativa moderada. A direção negativa da correlação sugere uma relação inversa: quanto maior o escore do DMS, menor o escore do KDQOL-SF36, e vice-versa. A maioria dos participantes apresentava bom estado nutricional segundo o DMS e relataram boa qualidade de vida segundo o KDQOL-SF36. Conclusão: Existe uma correlação estatisticamente significativa entre o Dialysis Malnutrition Score e a qualidade de vida com base no KDQOL-SF36 em pacientes com DRC estágio 5 em hemodiálise na Unidade de Hemodiálise do RSUD Negara, Jembrana, Bali.
Palavras-chave: Doença Renal Crônica (DRC); Dialysis Malnutrition Score (DMS); Kidney Disease Quality of Life (KDQOL)-SF36; Hemodiálise; Qualidade de Vida.

Resumen
Introducción: La calidad de vida es uno de los principales resultados esperados en pacientes con enfermedad renal crónica (ERC) estadio 5 sometidos a hemodiálisis. Objetivo: Determinar la correlación entre DMS y calidad de vida basada en KDQOL-SF36 en pacientes con ERC estadio 5 sometidos a hemodiálisis en la Unidad de Hemodiálisis de RSUD Negara, Jembrana, Bali. Métodos: El estudio se realizó entre el 7 y el 30 de abril de 2025, en la Unidad de Hemodiálisis de RSUD Negara, Jembrana, Bali. Un total de 105 pacientes con ERC estadio 5 sometidos a hemodiálisis de 2015 a abril de 2025 participaron en el estudio. El estado nutricional se evaluó utilizando DMS, mientras que la calidad de vida se midió utilizando el cuestionario KDQOL-SF36. Resultados: La prueba de correlación de Spearman mostró una correlación estadísticamente significativa entre el DMS y la calidad de vida según el KDQOL-SF36 ($p < 0,001$), con un coeficiente de correlación de Spearman (r) de -0,592, lo que indica una correlación negativa moderada. La dirección negativa de la correlación sugiere una relación inversa: a mayor puntuación en el DMS, menor puntuación en el KDQOL-SF36, y viceversa. La mayoría de los participantes presentaban un buen estado nutricional según el DMS y reportaron una buena calidad de vida según el KDQOL-SF36. Conclusión: Existe una correlación estadísticamente significativa entre el Dialysis Malnutrition Score y la calidad de vida según el KDQOL-SF36 en pacientes con ERC estadio 5 en hemodiálisis en la Unidad de Hemodiálisis del RSUD Negara, Jembrana, Bali.
Palabras clave: Enfermedad Renal Crónica (ERC); Dialysis Malnutrition Score (DMS); Kidney Disease Quality of Life (KDQOL)-SF36; Hemodiálisis; Calidad de Vida.

1. Introduction

Chronic Kidney Disease (CKD) is a progressive and irreversible pathophysiological process with various etiologies, such as diabetes mellitus, hypertension, glomerular diseases, and obstructive nephropathy. This process leads to a gradual decline in kidney function, which may eventually progress to end-stage renal disease (ESRD). ESRD is a clinical condition in which kidney function has permanently declined to the point that it can no longer maintain internal homeostasis, requiring definitive renal replacement therapy in the form of hemodialysis, peritoneal dialysis, or kidney transplantation. According to Kidney Disease: Improving Global Outcomes (KDIGO), there are two main diagnostic criteria for CKD: Kidney damage lasting ≥3 months, either in the form of structural or functional abnormalities, with or without a decrease in glomerular filtration rate (GFR). This damage can be evidenced by pathological findings, abnormalities in blood or urine tests, or imaging results. A GFR <60 mL/min/1.73 m² for ≥3 months, with or without evidence of structural or functional kidney damage. Understanding this definition and these criteria is crucial for early detection and appropriate management of CKD to prevent progression to the terminal stage and to improve the overall quality of life of patients (Stevens et al., 2024; Suwitra, 2014; Widiana et al., 2021).

CKD is a global health issue with an increasing prevalence. Data show that CKD significantly contributes to the global disease burden, including in Indonesia. According to the latest report from the Indonesian Renal Registry (IRR) up to 2022, there were 63,489 new CKD patients who began hemodialysis therapy, with a total of 158,929 active patients undergoing routine hemodialysis throughout Indonesia. Although official 2024 data have not yet been published, trends from previous IRR reports indicate a yearly increase in patient numbers, reflecting the growing burden of CKD in the population. This rise highlights the importance of focusing on the quality of life and nutritional status of hemodialysis patients as part of comprehensive disease management (Indonesian Renal Registry, 2020; Menteri Kesehatan Republik Indonesia, 2023; Stevens et al., 2024).

The etiology of chronic kidney disease (CKD) varies significantly between countries, depending on genetic, environmental, socioeconomic factors, and the prevalence of comorbid conditions. In the United States, data from 1995 to 1999 show that the leading cause of CKD was diabetes mellitus, accounting for 44% of cases—7% due to type 1 diabetes and 37% due to type 2 diabetes. Hypertension and large vessel diseases contributed 27%, followed by glomerulonephritis (10%), interstitial nephritis (4%), cystic diseases and other congenital abnormalities (3%), systemic diseases such as systemic lupus erythematosus and vasculitis (2%), neoplasms (2%), unknown causes (4%), and other causes (4%). In Indonesia, data from the Indonesian Society of Nephrology (Pernefri) in 2000 revealed a markedly different distribution of causes of chronic kidney failure in patients undergoing hemodialysis. Glomerulonephritis was the leading cause, accounting for 46.39% of cases, followed by diabetes mellitus (18.65%), urinary tract obstruction and infections (12.85%), hypertension (8.46%), and other causes (13.65%). These variations reflect epidemiological differences in CKD across regions, influenced by healthcare access, early detection, and optimal management of comorbid diseases (Stevens et al., 2024; Suwitra, 2014; Widiana et al., 2021).

The diagnostic approach to CKD is multidimensional and includes clinical evaluation, laboratory tests, imaging studies, and histopathological examination via kidney biopsy. Accurate diagnosis is crucial to identify the underlying cause, assess disease severity, and guide appropriate management. Clinical manifestations of CKD can vary depending on the underlying disease and stage of progression. Symptoms can be grouped as follows:

a) Primary symptoms based on etiology, such as those seen in diabetes mellitus, urinary tract infections, kidney stones, hypertension, hyperuricemia, or autoimmune diseases like systemic lupus erythematosus (SLE).
b) Uremic syndrome, including weakness, lethargy, anorexia, nausea, vomiting, nocturia, fluid overload, peripheral neuropathy, pruritus, "uremic frost," pericarditis, seizures, and coma.
c) Symptoms due to complications, such as hypertension, normochromic normocytic anemia, renal osteodystrophy, congestive heart failure, metabolic acidosis, and electrolyte imbalances (sodium, potassium, chloride).

Laboratory tests assess both the underlying disease and the extent of kidney damage. Typical findings include elevated serum urea and creatinine, reduced glomerular filtration rate (GFR), anemia, hyperkalemia or hypokalemia, hyperphosphatemia, hypocalcemia, metabolic acidosis, and urinalysis showing proteinuria, hematuria, leukocyturia, casts, and isosthenuria. Imaging studies play an essential role in evaluating kidney anatomy. A plain abdominal X-ray may reveal radiopaque stones. Renal ultrasonography (USG), a noninvasive method, is useful for assessing kidney size (usually reduced in CKD), cortical thinning, hydronephrosis, kidney stones, cysts, masses, and calcifications. Kidney biopsy is performed in selected cases, particularly when kidney size is still within normal limits and noninvasive tests fail to establish a diagnosis. Histopathological examination of biopsy specimens provides detailed information on the type and degree of damage in the glomeruli, tubules, interstitium, and vasculature (Indonesian Renal Registry, 2020; Menteri Kesehatan Republik Indonesia, 2023; Stevens et al., 2024; Suwitra, 2014; Widiana et al., 2021).

The management of chronic kidney disease (CKD) is multidimensional and encompasses various strategies aimed at slowing disease progression, preventing complications, and improving patient quality of life. Management strategies include targeted therapy for the underlying cause of CKD, prevention and treatment of comorbid conditions, slowing the decline in kidney function, and preventing and managing cardiovascular disease. This approach also involves managing CKD-related complications and preparing for renal replacement therapy (RRT)—either dialysis or kidney transplantation—in the advanced stages. CKD management begins with lifestyle modifications, such as reducing sodium intake, quitting smoking, and engaging in regular physical activity. Blood pressure control is a critical component, with treatment targets tailored to the patient's clinical condition. The use of renin-angiotensin system inhibitors, such as ACE inhibitors or angiotensin receptor blockers (ARBs), is highly recommended, particularly in patients with proteinuria. Glycemic control in diabetic patients requires strict blood sugar management to prevent further kidney damage. Dyslipidemia is managed with statins to reduce the risk of cardiovascular disease, which is the leading cause of morbidity and mortality in CKD patients. Anemia is treated with erythropoiesis-stimulating agents (ESAs) and iron supplementation when necessary. Mineral and bone disorders require monitoring and control of calcium, phosphate, and parathyroid hormone (PTH) levels. Planning for RRT in advanced CKD should be done proactively, with options including: Hemodialysis, a medical procedure used to replace the function of failed kidneys by removing uremic toxins, excess fluid (ultrafiltration), and regulating electrolyte balance (Na^+, K^+, Ca^{2+}, etc.); continuous Ambulatory Peritoneal Dialysis (CAPD); or kidney transplantation. Early detection, regular monitoring, and a multidisciplinary approach—involving internists, nephrologists, dietitians, and other healthcare providers—are essential for slowing CKD progression and improving patient outcomes (Animaw et al., 2022; Stevens et al., 2024).

Patients with stage 5 CKD undergoing hemodialysis often experience malnutrition, due to several factors: Reduced food intake caused by nausea, vomiting, or strict dietary restrictions; Increased protein catabolism from chronic inflammation and loss of amino acids during dialysis; Micronutrient deficiencies (e.g., vitamins and minerals) due to their removal during dialysis.

The prevalence of malnutrition in hemodialysis patients is reported to be 40–70%, depending on the assessment method and the population studied. Several studies indicate that good nutritional status is associated with better quality of life, as it: Enhances immune function, reducing the risk of infections and complications; Improves physical strength, enabling patients to be more active in daily life; Reduces fatigue; Provides better psychosocial support. Malnutrition has a significant impact on quality of life, increasing hospitalization rates, accelerating disease progression, and worsening long-term prognosis. Therefore, systematic nutritional assessment and ensuring adequate nutrition are crucial for stage 5 CKD patients on hemodialysis. Proper nutritional intervention programs, including monitoring protein intake, micronutrient supplementation, and effective dietary education, can help improve patient quality of life (Carrero et al., 2013; Hayati et al., 2021).

In general, nutritional status assessment can be done using various methods such as Body Mass Index (BMI), Subjective Global Assessment (SGA), Dialysis Malnutrition Score (DMS) or Malnutrition Inflammation Score (MIS), serum albumin, and muscle mass index. One tool specifically used to assess nutritional status in stage 5 CKD patients undergoing hemodialysis is a specialized method like DMS or MIS. These methods are modifications of the SGA and take into account multiple factors related to malnutrition.

The DMS assessment includes 7 parameters: Weight history (weight loss in the last 6 months), Changes in food intake (reduced food consumption), Gastrointestinal symptoms (nausea, vomiting, and diarrhea), Functional capacity and physical ability (weakness, reduced physical activity), Subcutaneous fat (fat tissue atrophy), Muscle mass (muscle wasting), Clinical condition and inflammation status. DMS assesses the overall health condition, including signs of chronic inflammation such as comorbidities frequently experienced by hemodialysis patients. Each parameter is scored from 1 (normal) to 5 (severe). The total score ranges from 7 to 35, with higher scores indicating more severe malnutrition. MIS is a more comprehensive tool that includes inflammatory factors in addition to nutritional status. MIS is often used to predict mortality and quality of life in dialysis patients. The MIS assessment consists of 10 parameters, including those from DMS (7 factors), serum albumin, C-reactive protein (CRP) or other inflammation markers, and BMI or weight changes. The total score ranges from 0 to 30, with higher scores reflecting more severe malnutrition-inflammation. Higher DMS/MIS scores correlate with decreased quality of life, fatigue, physical frailty, and increased mortality risk. MIS is more accurate than DMS because it includes inflammation, a key factor in chronic kidney disease patients. The advantage of DMS is that it is more practical and simpler since it only relies on subjective and clinical data and does not require laboratory tests (Harvinder et al., 2016; Tabibi et al., 2011)

Quality of life in hemodialysis patients can be assessed using the Kidney Disease Quality of Life (KDQOL) or the SF-36 (Short Form Health Survey), which covers physical, psychological, social, and emotional aspects. Factors influencing quality of life include: Nutritional status (malnutrition is associated with fatigue, weakness, and low immunity), Hemodialysis complications (hypotension, hypoglycemia, infection, and anemia), Mental health (depression, insomnia, and anxiety are commonly found in patients) (Cohen et al., 2019; Joshi et al., 2010).

This study aims to determine the correlation between the Dialysis Malnutrition Score (DMS) and quality of life based on the Kidney Disease Quality of Life Short Form-36 (KDQOL-SF36) in stage 5 kidney disease patients undergoing hemodialysis at the Dialysis Unit of RSUD Negara, Jembrana, Bali in 2025.

2. Methodology

Design and Subjects

This study is an observational study with a cross-sectional design (Pereira et al., 2018) using simple descriptive statistics with the use of data classes and absolute frequency and relative frequency percentage values (Shitsuka et al., 2014; Akamine & Yamamoto, 2009) and, with the use of statistical analysis (Bekman & Costa Neto, 2009), conducted at the Dialysis Unit of the Regional General Hospital (RSUD) Negara, Jembrana, Bali, from April 7, 2025, to April 30, 2025, involving patients undergoing hemodialysis. The sample size in this study was 105, determined using the sample size correction formula for a limited population of 145 individuals, selected by consecutive sampling. The participants included both males and females aged between 20 and 85 years who did not have liver complications, cancer, or HIV, and who consented to participate by signing informed consent. Nutritional status data were collected through interviews using the DMS questionnaire, while quality of life data were collected by filling out the KDQOL-SF-36 questionnaire.

Inclusion criteria for this study were patients who had been undergoing hemodialysis for at least 6 months, understood and could communicate in Indonesian, were cooperative, and were willing to participate as respondents and had signed informed consent.

Exclusion criteria included patients with Acute Kidney Injury (AKI), patients in conditions unsuitable for interviews, those changing dialysis therapy, patients with cognitive impairment, and those who refused or were unwilling to participate as samples.

Data Collection and Measurement

The independent variable studied was nutritional status, while the dependent variable was quality of life. Data collection was carried out by the researcher, assisted by the attending doctor and hemodialysis nurses.

Determination of Nutritional Status

Nutritional status was assessed using the Dialysis Malnutrition Score (DMS) questionnaire, which has a sensitivity of 94% and a specificity of 88%. The DMS questionnaire consists of 7 components, namely:

- Weight history (weight loss in the last 6 months)
- Changes in food intake (decreased food intake)
- Gastrointestinal symptoms (nausea, vomiting, and diarrhea)
- Functional capacity and work ability (weakness, decreased physical activity)
- Subcutaneous fat (atrophy of fat tissue)
- Muscle mass (muscle wasting)
- Clinical condition and inflammatory status.

DMS assesses the general health condition, including signs of chronic inflammation such as comorbid diseases often experienced by hemodialysis patients. Each parameter is scored subjectively from 1 (normal) to 5 (severe). A score of 1 indicates normal nutritional status, scores from 2 to 4 indicate mild to moderate malnutrition, and a score of 5 indicates a very severe condition or poor nutritional status. The total score ranges from 7 to 35, with classifications as follows: 7-10: good (normal) nutritional status, 11-17: mild to moderate malnutrition, 18-35: severe malnutrition (Carrero et al., 2013; Hayati et al., 2021).

The quality of life of hemodialysis patients was measured using the standardized English version of the KDQOL-SF36 questionnaire, which has relevant reliability and validity values above 0.8, except for the cognitive domain (0.68) and social interaction quality domain (0.61). The KDQOL-SF36 consists of two main parts:

a) The 12-item Short Form Health Survey (SF-12) assesses general physical and mental components divided into 8 domains:
   - Physical Functioning (PF) – 2 items
   - Role Physical (RP) – 2 items
   - Bodily Pain (BP) – 1 item
   - General Health (GH) – 1 item
   - Vitality (VT) – 1 item
   - Social Functioning (SF) – 1 item
   - Role Emotional (RE) – 2 items
   - Mental Health (MH) – 2 items

From these 8 domains, two summary scores can be calculated: Physical Component Summary (PCS) and Mental Component Summary (MCS).

b) Kidney Disease Targeted Areas (kidney-specific supplement) consisting of 3 parts:
   - Kidney disease problems – 12 questions
   - Impact of kidney disease – 8 questions
   - Burden of kidney disease – 4 questions

Each question item is scored with a numeric code (scale 1-5, 1-6, etc.). Some items require reverse scoring so that a higher score always indicates better health. After coding, each domain score is calculated and converted to a 0–100 scale, where 0 represents the worst quality of life and 100 represents the best quality of life. In this study, KDQOL-SF36 scores were categorized as follows: 0–49 = poor quality of life; 50–74 = moderate quality of life; 75–100 = good quality of life (Cohen et al., 2019; Joshi et al., 2010; Tabibi et al., 2011).

The research results obtained were then calculated using standard formulas, averaged, and subsequently categorized. Data analysis in this study employed bivariate analysis using Spearman's correlation test, because one of the variables analyzed did not have a normal distribution.

3. Results

The subjects of this study were all chronic kidney failure patients who underwent hemodialysis from 2015 until April 2025 at the Dialysis Unit of RSUD Negara, Jembrana. Based on the initial sample size calculation formula (without population correction) and the sample size calculation with correction for a limited population of 145, the sample size for this study was determined to be 105 patients. Data regarding the general characteristics of the study subjects are presented in Table 1 below;

Table 1 - Subject Characteristics (n =105).

Variable	Category	Total	
		n	%
Gender	Male	62	59,0
	Female	43	41.0
Age	0-20	1	1
	21-30	8	7.6
	31-40	4	3.8
	41-50	24	22.9
	51-60	36	34.3
	61-70	26	24.8
	>71	6	5.7
Employement	Employed	8	7.6
	Unemployed	97	92.4
Education	Elementary school	47	44.8
	Junior high school	15	14.3
	Senior high school	30	28.6
	University	13	12.4
Length of Hemodialysis	< 1 Year	9	8.57
	1-5 Years	64	60.95
	6 -10 Years	32	30.47
Hemodialysis Frequency	1x / week	18	17.14
	2x / week	87	82.86
Cause of Chronic Kidney Disease	Hypertension	42	40.0
	Diabetes Mellitus (DM)	20	19.05
	Hypertension and DM	14	13.33
	Kidney Stone	9	8.57
	Gout	6	5.72
	Polycystic Kidney Disease	2	1.91
	Others	12	11.43

Source: Research data (2025).

Table 1 shows that the number of male subjects was 62 (59.0%), which was higher than female subjects at 43 (41.0%). Most subjects were aged between 51-60 years, totaling 36 individuals (34.3%), and the majority had an education level of elementary school (SD), with 47 subjects (44.8%). Most patients were unemployed (92.4%). The average duration of hemodialysis was between 1-5 years (60.95%), and the most common frequency of hemodialysis was twice a week (82.86%).

Hypertension was the leading cause of chronic kidney failure, accounting for 40.0% of cases. Next, Table 2 shows the description of categorical variables.

Table 2 - Description of categorical variables: Hemoglobin (HB), Albumin, Blood Flow Rate (QB), KT/V, Dialysis Malnutrition Score (DMS), and KDQOL-SF36 (n = 105).

Variable	Category	Total	
		n	%
Hemoglobin	< 6	1	1.0
	6 - 7.9	50	47.6
	8 - 9.9	47	44.8
	10 - 11	5	4.8
	> 11	2	1.9
Albumin	< 2	1	1.0
	2.0 - 2.9	6	5.7
	3.0 - 3.9	82	78.1
	> 4.0	16	15.2
QB	< 200	17	16.25
	200 - 250	73	69.5
	251 - 300	15	14.3
KT/V	< 1.2	8	7.6
	1.2 - 1.4	57	54.3
	> 1.4	40	38.1
DMS	Normal - Mild Malnutrition	4	3.8
	Moderate Malnutrition	99	94.3
	Severe Malnutrition	2	1.9
KDQOL-SF36	Poor	29	27.6
	Moderate	70	66.7
	Good	6	5.7

*QB: Blood Flow Rate, DMS: Dialysis Malnutrition Scor, KDQOL-SF36: Kidney Disease Quality of Life Short Form 36.
Source: Research data (2025).

Table 2 shows that most study subjects had hemoglobin levels between 6 and 7.9 g/dL (47.6%), albumin levels between 3.0 and 3.9 g/dL (78.1%), an average blood flow rate (QB) between 200 and 250 mL/min (69.5%), and KT/V values between 1.2 and 1.4 (54.3%). Regarding nutritional status, 94.3% of subjects were classified as having moderate malnutrition based on the Dialysis Malnutrition Score (DMS). The Kidney Disease Quality of Life Short Form 36 (KDQOL-SF36) scores were predominantly in the moderate quality of life category (66.7%).

Nutritional status based on the Dialysis Malnutrition Score (DMS)

Nutritional status based on the Dialysis Malnutrition Score (DMS) consists of three categories: good nutritional status, mild to moderate malnutrition, and severe malnutrition. In this study, there were 4 patients (3.8%) classified as normal to mild malnutrition, 99 patients (94.3%) classified as moderate malnutrition, and 2 patients (1.9%) classified as severe malnutrition. The average score was 15.00, with the lowest score being 9 and the highest score being 24.

Quality of life based on the Kidney Disease Quality of Life (KDQOL-SF36)

Quality of life refers to each individual's perception of their position in life. The assessment of quality of life in this study is based on the KDQOL-SF36 questionnaire, which consists of three categories: poor, moderate, and good quality of life. Scoring is done by evaluating each question in the KDQOL-SF36 questionnaire, assigning codes, and then converting the results to a scale of 0–100, where a higher score indicates a better quality of life. The analysis results in this study showed that many subjects had a moderate quality of life (66.7%).

Relationship between Nutritional Status and Quality of Life

Patients with end-stage chronic kidney disease (CKD stage 5) who undergo regular hemodialysis are at higher risk of experiencing nutritional disorders that can lead to malnutrition. This may result from the loss of essential nutrients during the procedure, as well as other factors such as dietary restrictions, reduced appetite, and chronic inflammation. Patients undergoing chronic hemodialysis often experience a significant decline in quality of life due to physical problems such as chronic fatigue, muscle and joint pain, sleep disturbances, itching (pruritus), and sexual dysfunction; Psychological issues such as depression and anxiety, social and economic stress, and lowered self-esteem; Social and lifestyle challenges such as dietary and fluid restrictions, time limitations, dependence on medical facilities, and disruptions in family and social relationships. Table 3 shows the Test of Normality:

Table 3 - Test of Normality DMS and KDQOL-SF36.

Tests of Normality

	Kolmogorov-Smirnov[a]			**Shapiro-Wilk**		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
DMS	.157	105	<,001	.959	105	.003
KDQOL-SF36	.063	105	.200*	.985	105	.303

*. *This is a lower bound of the true significance.* Source: Research data (2025).

Based on Table 3, it is shown that the DMS variable, after undergoing the Kolmogorov-Smirnov normality test, yielded a probability value (P) of < 0.001. Since the p-value is less than 0.05, it is concluded that the DMS variable is not normally distributed. Subsequently, a data transformation was applied to the DMS variable (tran_DMS), and the transformed variable was again tested for normality using the Kolmogorov-Smirnov test. This also produced a probability value (P) of < 0.001. Since the p-value is still less than 0.05, it is concluded that the tran_DMS variable is also not normally distributed. For the KDQOL-SF36 variable, the Kolmogorov-Smirnov normality test resulted in a probability value (P) of 0.200. Since the p-value is greater than 0.05, it is concluded that the KDQOL-SF36 variable is normally distributed. Because one of the variables (DMS) is not normally distributed, the Pearson correlation test (a parametric test) cannot be used. Therefore, the alternative test, the Spearman correlation test, was used to assess the correlation between the DMS and KDQOL-SF36 variables. Next, Table 4 shows the correlation between DMS with KDQOL-SF36:

Table 4 - Correlation between DMS with KDQOL-SF36.

Correlations

			DMS	KDQOL-SF36
Spearman's rho	DMS	Correlation Coefficient	1.000	-.592**
		Sig. (2-tailed)	.	<,001
		N	105	105
	KDQOL-SF36	Correlation Coefficient	-.592**	1.000
		Sig. (2-tailed)	<,001	.
		N	105	105

**. *Correlation is significant at the 0.01 level (2-tailed).* Source: Research data (2025).

From the data analysis results in Table 4, a significance value of < 0.001 was obtained, indicating a statistically significant correlation between the DMS score variable and the KDQOL-SF36 score variable, as the p-value is less than 0.05. The Spearman correlation coefficient (Spearman's rho) is -0.592, which indicates a moderate correlation strength (range 0.40–0.599). The negative direction of the correlation indicates an inverse relationship—as the DMS score increases, the KDQOL-SF36 score tends to decrease, and conversely, as the DMS score decreases, the KDQOL-SF36 score tends to increase.

4. Discussion

Subject Characteristics

The frequency distribution of subject characteristics based on gender shows that 59.0% of the subjects in this study were male and 41.0% were female. This is consistent with previous studies indicating that more hemodialysis patients are male (65%) compared to female (35%) (Anita, 2018). The progression of chronic kidney disease (CKD) in women tends to be slower than in men. One contributing factor is the role of estrogen, which is present in higher levels in women. Estrogen is known to have protective effects on kidney tissue through various mechanisms, including its influence on calcium metabolism. This hormone can reduce the production of pro-inflammatory cytokines and inhibit osteoclast activity, thereby helping to maintain bone density and reduce calcium release into the bloodstream. Adequate calcium availability in the body also helps inhibit oxalate absorption in the gastrointestinal tract. Since excess oxalate can lead to kidney stone formation (nephrolithiasis), a known risk factor for CKD, estrogen indirectly contributes to slowing the progression of the disease in women (Weinstein & Anderson, 2010).

Most of the subjects in this study were over the age of 40 (87.7%). After the age of 40, the glomerular filtration rate (GFR) declines progressively, decreasing by approximately 50% by the age of 70. Physiologically, hemodialysis patients generally begin to experience organ function decline and reduced physiological reserves with increasing age, particularly after age 50. This is marked by reduced muscle mass (sarcopenia), decreased immune response, altered fluid and electrolyte metabolism, and an increased risk of malnutrition and frailty. This aging process is further exacerbated by chronic metabolic stress caused by uremia and repeated hemodialysis procedures, which cumulatively accelerate the decline in cognitive function, physical endurance, and overall quality of life for patients (Groer, 2001; Puspitasari et al., 2024; Suwitra, 2014).

In this study, it was found that the majority of subjects undergoing regular hemodialysis were no longer employed (92.4%), with only 7.6% of patients maintaining their work activities after starting hemodialysis therapy. Prior to developing end-stage chronic kidney disease, most patients reportedly held stable jobs. This finding indicates a significant decline in patients' functional status and productivity, likely due to physical weakness, chronic fatigue, and the time and energy demands associated with the high frequency of hemodialysis sessions. Most hemodialysis patients experience reduced functional capacity, marked by muscle weakness, persistent fatigue, and diminished tolerance for physical activity, all of which contribute to decreased work productivity. As a result, many patients are no longer able to maintain employment or engage in economic activities optimally. This ongoing physical debilitation is often a consequence of energy-protein malnutrition, chronic inflammation, and the accumulation of uremic toxins—conditions that are further exacerbated by the physical burden of undergoing hemodialysis two to three times per week. Consequently, the rate of inactivity or unemployment among hemodialysis patients is relatively high compared to the general population. Additionally, individuals with demanding work schedules are more prone to experiencing sleep dysregulation, irregular eating patterns, and inadequate fluid intake—particularly of plain water. When sustained over long periods, such habits can increase the risk of metabolic disorders and organ dysfunction, including impaired kidney function due to chronic dehydration and high metabolic load (Ye et al., 2022).

In this study, the majority of hemodialysis patients had completed only elementary school education (44.8%), which aligns with previous studies showing that 46.7% of hemodialysis patients had an elementary-level education. Educational level plays a significant role in various aspects of chronic disease prevention, detection, and management, including chronic kidney disease (CKD). Firstly, higher education levels are generally associated with better knowledge of healthy lifestyles, such as balanced nutrition, regular physical activity, smoking cessation, understanding of kidney disease risk factors like hypertension and diabetes mellitus, and the importance of regular health check-ups. Secondly, education influences access to healthcare services both directly and indirectly. Individuals with higher education are more likely to have formal employment that provides health insurance, greater financial capacity, and better access to reliable medical information. Thirdly, education affects decision-making related to treatment. Patients with higher education tend to have better health literacy, greater understanding of treatment instructions, higher adherence to medical recommendations, and are more proactive in monitoring and managing their own health. Fourthly, early detection and intervention of CKD are also linked to educational background. Patients with lower education levels often experience delays in recognizing symptoms, show less initiative in undergoing health screenings, and face challenges in understanding medical information. These factors can lead to a late diagnosis and treatment of CKD, often at advanced stages (Fadare et al., 2015).

The majority of subjects in this study had undergone hemodialysis therapy for a duration of 1 to 5 years (60.95%). This finding is consistent with other studies reporting that most chronic kidney disease (CKD) patients receive hemodialysis for less than five years, with a prevalence of 56.9%. In terms of hemodialysis frequency, most respondents underwent treatment twice per week (82.86%), while the remaining 17.14% underwent dialysis once per week. This frequency is still within the standard range of 2 to 3 sessions per week, each lasting 3–5 hours—or approximately 10–16 hours per week—as recommended for optimal hemodialysis therapy. The most common underlying cause (etiology) of CKD among the study subjects was hypertension, accounting for 40.0% of cases. This supports previous epidemiological data indicating that hypertension, alongside diabetes mellitus, is a leading risk factor for the development of end-stage CKD requiring renal replacement therapy (Mehrotra, 2015; Pradipta et al., 2018).

The results of this study show that the majority of subjects had hemoglobin levels in the range of 6–7.9 g/dL (47.6%), indicating moderate to severe anemia—a common condition among end-stage chronic kidney disease (CKD) patients undergoing hemodialysis. Additionally, most patients had albumin levels between 3.0–3.9 g/dL (78.1%), which is below the normal range and reflects suboptimal nutritional status. The average blood flow rate (QB) during hemodialysis for most subjects was between 200–250 mL/min (69.5%), which is a typical range in conventional hemodialysis practice. The KT/V values—an indicator of dialysis adequacy—showed that the majority of patients had KT/V values between 1.2–1.4 (54.3%), meeting the minimum adequacy standard recommended by the Kidney Disease Outcomes Quality Initiative (KDOQI). Nutritional status assessment using the Dialysis Malnutrition Score (DMS) revealed that most patients (94.3%) experienced moderate malnutrition. Meanwhile, the quality of life assessment using the KDQOL-SF™ 36 instrument showed that 66.7% of subjects had a moderate quality of life. This reflects the cumulative impact of clinical conditions, nutritional status, and dialysis adequacy on both the physical and psychosocial aspects of the patients' lives (Hays et al., 1994; Kalantar-Zadeh et al., 2001).

Nutritional Status Based on the Dialysis Malnutrition Score (DMS)

Nutritional status based on the Dialysis Malnutrition Score (DMS) is classified into three categories: good nutritional status, mild–moderate malnutrition, and severe malnutrition. The assessment of nutritional status using DMS has been widely used in various countries, including Indonesia, and is one of the recommended methods for screening nutritional status in patients with chronic kidney disease (CKD) undergoing hemodialysis. DMS is a more sensitive, practical, and simple assessment tool because it does not require laboratory tests. This instrument can be used by all healthcare workers in healthcare facilities and has the advantage of detecting small changes in nutritional status periodically. The validity of this questionnaire has been extensively tested and proven effective as a screening tool for the nutritional status of dialysis patients.

The findings in this study show that the majority of patients (94.3%) experienced moderate malnutrition based on the DMS score, with an average score of 15.00, a lowest score of 9, and a highest score of 24. The proportion of patients with severe malnutrition was also found (1.9%), while only 3.8% were categorized as having good nutritional status or mild malnutrition. These results reflect a significant nutritional status problem in the hemodialysis patient population. These findings are consistent with the study by Kalantar-Zadeh et al. (2001), who developed and validated the Malnutrition–Inflammation Score (MIS) as an extension of the DMS. In their research, Kalantar-Zadeh emphasized that malnutrition and chronic inflammation are strong predictors of morbidity and mortality in hemodialysis patients and stated that the DMS is a sensitive and valid tool for detecting the nutritional status of dialysis patients without requiring laboratory tests (Kalantar-Zadeh et al., 2001).

Thus, the high DMS scores found in this study can be considered an early indicator of greater clinical risk, including decreased quality of life and increased mortality. Additionally, the study by Hayati et al. (2021) also supports these findings, reporting that 78% of hemodialysis patients assessed using DMS fell into the mild–moderate malnutrition category. This indicates that malnutrition is a common and persistent problem among CKD patients at various hemodialysis centers in Indonesia. In other words, the findings in this study reinforce both national and international data regarding the high prevalence of nutritional status disorders in hemodialysis patients (Hayati et al., 2021).

Quality of Life Based on the Kidney Disease Quality of Life (KDQOL-SF36)

The results of this study show that many patients (66.7%) have a moderate quality of life, while 27.6% of patients have a poor quality of life. These findings illustrate that although chronic kidney disease (CKD) patients undergo routine haemodialysis, they still experience physical, psychological, and social limitations that impact their perception of quality of life.

The quality of life assessment in this study used the KDQOL-SF™ 36 instrument, which has been validated as a comprehensive tool to evaluate both general health aspects and kidney disease-specific aspects. This instrument was developed by Hays et al. (1994), who stated that quality of life scores are closely correlated with patients' actual health status as well as their surrounding psychosocial conditions. These findings are consistent with the study by Afsar and Akman (2009), which found that family support and sleep quality play important roles in determining the quality of life of dialysis patients. In this study, most patients reported being able to adapt to their condition due to support from their families, which serves as a psychological and social buffer in facing the challenges of hemodialysis (Afsar & Akman, 2009; Hays et al., 1994).

A study by Mapes et al. (2003) through the Dialysis Outcomes and Practice Patterns Study (DOPPS) also reinforces these findings, showing that better quality of life is significantly associated with reduced rates of hospitalization and mortality in hemodialysis patients (Mapes et al., 2003). In other words, quality of life is not only a subjective indicator but also has clinical predictive value for patients' long-term outcomes. Meanwhile, the finding that 27.6% of patients still have poor quality of life indicates the need for multidimensional interventions, especially targeting physical factors (fatigue, pain), psychological factors (depression, anxiety), social factors (isolation), and economic factors (treatment costs). This aligns with the concept proposed by Hays and Mapes that these factors are interconnected and cumulatively affect the perception of quality of life (Hays et al., 1994; Mapes et al., 2003).

The relationship between nutritional status based on the Dialysis Malnutrition Score (DMS) and quality of life based on the Kidney Disease Quality of Life (KDQOL-SF36)

This study shows a statistically significant negative correlation between nutritional status (DMS) and quality of life (KDQOL-SF36) in hemodialysis patients, with a p-value < 0.001 and a Spearman correlation coefficient of –0.592, which is classified as a moderate correlation. The negative direction of this correlation indicates that the worse the patient's nutritional status (the higher the DMS score), the lower the quality of life score (KDQOL-SF36), and vice versa. The significant negative correlation between DMS and KDQOL-SF36 suggests that poor nutritional status is a risk factor for reduced quality of life in hemodialysis patients and can serve as an important indicator in periodic evaluations and the determination of clinical intervention priorities. These findings align with the research by Kalantar-Zadeh et al. (2001), who stated that malnutrition and inflammation are important factors contributing to decreased functional status and quality of life in hemodialysis patients. In their study, Kalantar-Zadeh showed that malnutrition scores negatively correlate with various quality of life domains, such as physical function, vitality, and overall health status (Kalantar-Zadeh et al., 2001). A study by Mapes et al. (2003) within the Dialysis Outcomes and Practice Patterns Study (DOPPS) also supports these findings. They reported that patients with poor nutritional status more often experience lower quality of life, increased hospitalizations, and a higher risk of mortality compared to patients with good nutritional status (Mapes et al., 2003).

This means that nutritional status affects not only physical aspects but also psychological, social, and role function domains in patients' daily lives, as reflected in the KDQOL-SF36 scores. The research by Hayati et al. (2021) also reported that the majority of patients with mild to moderate malnutrition based on DMS tend to have decreased quality of life, reinforcing that declining nutritional status is closely related to lowered perceptions of life and health in CKD patients undergoing hemodialysis (Hayati et al., 2021).

The negative relationship between DMS and KDQOL-SF36 in this study indicates that nutritional interventions are not only important for preventing clinical complications but also have a direct impact on improving patients' quality of life. Therefore, routine nutritional status screening using DMS should be maintained as part of the comprehensive evaluation of hemodialysis patients.

Various determinant factors are known to significantly influence the quality of life of chronic kidney disease (CKD) patients undergoing hemodialysis. These factors include physical ability, comorbidities, albumin and hemoglobin levels, duration of hemodialysis therapy, sleep quality, anxiety levels, age, gender, ethnicity, living environment, family support, social relationships, employment status, marital status, and education level (Indonesian Renal Registry, 2020; Menteri Kesehatan Republik Indonesia, 2023; Stevens et al., 2024; Suwitra, 2014; Widiana et al., 2021). The diversity of these factors shows that the quality of life of CKD patients results from a complex interaction of biological, psychological, social, and environmental aspects, and thus cannot be explained by a single variable alone (Alshogran et al., 2021; Eswarappa et al., 2024).

However, this study has several methodological limitations. First, the researchers did not differentiate subjects based on the frequency of hemodialysis sessions (e.g., once, twice, or three times per week), even though some studies have shown that dialysis frequency and adequacy are directly related to patients' nutritional status and quality of life (28,30). Second, in establishing inclusion and exclusion criteria, this study did not consider important clinical variables such as hemoglobin levels, albumin, blood pressure, and comorbidity levels, which have been empirically shown to be associated with reduced quality of life (Eswarappa et al., 2024; Kang et al., 2015).

This study also focused solely on analyzing the relationship between the Dialysis Malnutrition Score (DMS) and quality of life (KDQOL-SF36), without including other variables in a multivariate analysis that could control for potential bias. For example, anemia and hypoalbuminemia, common clinical conditions in hemodialysis patients, were not analyzed separately, even though both can significantly contribute to patients' perception of quality of life (Eswarappa et al., 2024).

Therefore, future research is recommended to integrate a more comprehensive approach, involving multivariate analyses of clinical, demographic, and psychosocial variables to gain a holistic understanding of the factors influencing the quality of life in hemodialysis patients (Alshogran et al., 2021; Eswarappa et al., 2024; Kang et al., 2015)

5. Conclusions

This study shows a significant relationship between nutritional status based on the Dialysis Malnutrition Score (DMS) and quality of life based on the Kidney Disease Quality of Life Short Form 36 (KDQOL-SF36) in stage 5 chronic kidney disease patients undergoing hemodialysis at the Dialysis Unit of RSUD Negara, Jembrana, Bali, in 2025. The majority of study subjects were in the moderate malnutrition category, totaling 99 individuals (94.3%), and most had a moderate quality of life category (66.7%).

Bivariate analysis using Spearman's correlation test showed a statistically significant correlation between DMS scores and KDQOL-SF36 scores with a p-value < 0.001, indicating a significant relationship ($p < 0.05$). The Spearman's rho correlation coefficient was –0.592, indicating a moderate correlation strength (0.40–0.599) with a negative correlation direction. This means that the higher the DMS score (worse nutritional status), the lower the KDQOL-SF36 score (worse quality of life). Conversely, the lower the DMS score, the higher the KDQOL-SF36 score.

Based on these findings, assessing nutritional status using the Dialysis Malnutrition Score (DMS) is recommended as an effective and practical screening tool for hemodialysis patients. Routine evaluation using DMS is important for early detection of nutritional status decline, enabling faster and more appropriate nutritional and clinical interventions to maintain or improve patients' quality of life.

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Conflict of interest

This scientific work was conducted independently. The authors declare that there are no conflicts of interest, either financial or personal, with any individuals or organizations that could improperly influence the content and results of this study.

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