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Nutritional status parameters as predictors of Malnutrition Inflammation Score (MIS) in hemodialysis patients at Dr. Sardjito General Hospital, Indonesia

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Objectives : Malnutrition and inflammation are crucial risk factors impacting the prognosis of hemodialysis (HD) patients. The Malnutrition Inflammation Score (MIS) evaluates the nutritional status and inflammation levels in these patients, closely linked to increased morbidity and mortality. This study aims to investigate the sensitivity of various nutritional status parameters in predicting the Malnutrition Inflammation Score (MIS) among hemodialysis (HD) patients, to improve early identification and management of at-risk individuals.

Methods : This observational cross-sectional study was conducted at the dialysis unit of Sardjito General Hospital, Yogyakarta, in October 2024. A total of 59 MHD patients undergoing dialysis twice a week were involved. Collected data included age, gender, hemodialysis vintage, Dialysis Malnutrition Score (DMS) form, anthropometric data (BMI, MUAC, total fat percentage, visceral fat), handgrip strength (HGS), and biochemical data (BUN, creatinine, total cholesterol, HDL-C, LDL-C, triglycerides, albumin, TIBC). MIS ranges from 0-30 and is categorized as malnutrition with a score of ≥ 5 . Chi-square test ($p < 0.05$) and diagnostic test (Sensitivity [Se], Specificity [Sp], Maximum Test Sensitivity Plus Specificity Threshold [MSS]) were used in data analysis.

Results : The prevalence of malnutrition based on MIS is 59.3%. There is a significant correlation between MIS and MUAC, %Total fat, HGS, creatinine, total cholesterol, LDL-C, triglycerides, and albumin ($p < 0.05$). This indicates that MHD patients with higher MIS scores tend to have worse outcomes in the nutritional status parameters mentioned above. The diagnostic test results, categorized based on the highest MSS, include the following values: DMS (142.9), triglycerides (136.79), LDL-C (134.17), total cholesterol (132.38), HGS (132.11), and creatinine (129.29).

Conclusions : DMS and HGS are more practical parameters for evaluating nutritional and inflammatory status in hemodialysis patients, as they do not necessitate laboratory testing.

Table 1.png



Table 1. Relationship among Malnutrition Inflammation Score (MIS) and Nutritional Status Parameters

Variables	MIS				<i>p</i> -value	
	Malnutrition		Well-nourished			
	n	%	n	%		
Gender	Male	19	61.3	12	38.7	0.746
	Female	16	57.1	12	42.9	
Age	≥60 years old	12	66.7	6	33.3	0.447
	18 – 59 years old	23	56.1	18	43.9	
MHD period	<5 years	16	51.6	15	48.4	0.205
	≥5 years	19	67.9	9	32.1	
DMS	Malnutrition	15	100.0	0	0.0	<0.001*
	Well-nourished	20	45.5	24	54.5	
BMI	Poor (<23.0 kg/m ²)	19	67.9	9	32.1	0.205
	Optimum	16	51.6	15	48.4	
MUAC	Poor	12	85.7	2	14.3	0.021*
	Optimum	23	51.1	22	48.9	
%Total Fat	Under	12	85.7	2	14.3	0.013*
	Normal	20	47.6	22	52.4	
Visceral Fat	Normal	5	41.7	7	58.3	0.222
	High	27	61.4	17	38.6	
Handgrip Strength (HGS)	Low	18	78.3	5	21.7	0.014*
	Optimum	16	45.7	19	54.3	
Blood Urea Nitrogen (BUN)	Low (<60 mg/dL)	31	62.0	19	38.0	0.324
	Normal	4	44.4	5	55.6	
Creatinine	Low (<9 mg/dL)	19	76.0	6	24.0	0.025*
	Normal	16	47.1	18	52.9	
Hemoglobin	Low	33	61.1	21	38.9	0.358
	Normal	2	40.0	3	60.0	
Total Cholesterol	Low (<150 mg/dL)	23	74.2	8	25.8	0.014*
	Normal	12	42.9	16	57.1	
HDL-C	Low	31	60.8	20	39.2	0.564
	Normal	4	50.0	4	50.0	
LDL-C	Low	28	71.8	11	28.2	0.006*
	Normal	7	35.0	13	65.0	
Triglyceride	Low (<150 mg/dL)	26	74.3	9	25.7	0.005*
	Normal	9	37.5	15	62.5	
Albumin	Low (<4 g/dL)	15	83.3	3	16.7	0.013*
	Normal	20	48.8	21	51.2	

**p*-value <0.05

Table 1.png



Table 2. Validity of Malnutrition Inflammation Score (MIS) compared to Nutritional Parameters

Variables	Se (%)	Sp (%)	MSS	PPV (%)	NPV (%)
DMS	42.90	100.0	142.9	100.0	54.55
BMI	54.29	50.00	104.29	61.29	42.86
MUAC	34.29	91.67	125.96	85.71	48.89
%Total Fat	37.50	91.67	129.17	85.71	52.38
Visceral Fat	15.62	70.83	86.45	41.67	38.64
Handgrip Strength	52.94	79.17	132.11	78.26	54.29
BUN	88.57	20.83	109.4	62.00	55.56
Creatinine	54.29	75.00	129.29	76.00	52.94
Hemoglobin	94.29	12.50	106.79	61.11	60.00
Total Cholesterol	65.71	66.67	132.38	74.19	57.14
HDL-C	88.57	16.67	105.24	60.78	50.00
LDL-C	80.00	54.17	134.17	71.79	65.00
Triglyceride	74.29	62.50	136.79	74.29	62.50
Albumin	42.86	87.50	130.36	83.33	51.22

Se: Sensitivity; Sp: Specificity; MSS: Maximum Test Sensitivity Plus Specificity Threshold; PPV: Positive Predictive Value; NPV: Negative Predictive Value