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## **Validity of Dialysis Malnutrition and Malnutrition Inflammation Score for Predicting Protein-Energy Wasting in Hemodialysis Patients**

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**Objectives:** The high prevalence of protein-energy wasting (PEW) in maintenance hemodialysis (MHD) patients is an emerging health problem especially in clinical setting. Lack of early detection tools to distinguish PEW among MHD patients is important to increase the wellbeing of patient. The Dialysis Malnutrition Score (DMS) and Malnutrition Inflammation Score (MIS) are tools that potential to predict PEW in MHD patients.

This study aims to assess the accuracy of DMS and MIS tools in predicting PEW among MHD patients.

**Methods:** A cross-sectional study design was conducted at dialysis unit, Universitas Gadjah Mada Hospital Yogyakarta, Indonesia in 2019. A total of 70 MHD patients who carried out dialysis 2x/ week were screened using DMS and MIS. Patients who scored >14 points in DMS and >5 in MIS were categorized as malnourished. Criteria of PEW proposed by the International Society of Renal Nutrition and Metabolism (ISRNM) was used as gold standard. Data were analyzed by Chi-square and ROC analysis.

**Results:** The prevalence of PEW in MHD patients according to ISRNM, MIS and DMS was 30%, 34.3%, and 54.3% respectively. Odd ratio of both screening tools was 15.00 (95% CI 3.132-71.830,  $p < 0.001$ ) for MIS and 11.1 (95% CI 3.376-36.571,  $p < 0.001$ ) for DMS. The sensitivity and specificity for MIS and DMS for detecting PEW were 90.48% vs 71.43% and 62.75% vs 81.63% respectively. The AUC of ROC of MIS and DMS tools were 0.759 and 0.765, both are categorized into acceptable screening tools.

**Conclusions:** The DMS and MIS tools are valid screening tools to detect PEW in MHD patients. MIS is more sensitive to screen patients at risk for PEW and DMS has a better value of specificity to diagnose PEW.

Table 1. Relationship among Dialysis Malnutrition Score (DMS) and Malnutrition Inflammation Score (MIS) and PEW

Screening Tools	ISRNM Criteria				Total		P	OR (CI 95%)
	PEW		Not PEW		n	%		
	n	%	n	%				
<b>DMS</b>								
Malnourished	15	62.50	9	37.50	24	100.0	<0.001	11.11(3.376-36.571)
Well Malnourished	6	13.04	40	86.96	46	100.0		
<b>MIS</b>								
Malnourished	19	50.0	19	50.0	38	100.0	<0.001	15.00(3.132-71.830)
Well Malnourished	2	6.25	30	93.75	32	100.0		

Table 2. Validity of Dialysis Malnutrition Score (DMS) and Malnutrition Inflammation Score (MIS) Compared to PEW Criteria

Screening Tool	Se (%)	Sp (%)	MSSS	PPV (%)	NPV (%)	AUC
DMS	71.43	81.63	153.06	62.50	86.96	0.765
MIS	90.48	62.75	153.23	50.00	94.12	0.759