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Assessment of Nutritional Status Using SGA (Subjective Global Assessment) and MIS (Malnutrition Inflammation Score) Tools in Hemodialysis Patients

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ABSTRACT

Introduction: One of the problems often found in patients undergoing hemodialysis is changes in their nutritional status. Patients with hemodialysis who are malnourished have a higher risk of disease and death. This nutritional disorder can be overcome by assessing nutritional status. Apart from using the SGA (Subjective Global Assessment) method, the MIS (Malnutrition Inflammation Score) method can also be used. The aim of this study was to compare differences in nutritional status of patients on hemodialysis using the SGA and MIS instruments.

Methods: This research was a quantitative research with a cross-sectional design. The research sample consisted of 75 patient with hemodialysis at one of military hospital, who were selected using non-probability techniques with a total sampling approach. The statistical test used is the Mann-Whitney test with level of significance 0.05 to compare differences between variables.

Results: Using the SGA tool, it was found that more than half of respondents (66.7%) were in the moderate nutrition category, while only 9.3% were in the malnutrition category. In contrast, with MIS tools, it was found that 34.7% were in the mild malnutrition and not malnourished category, while 65.3% were in the moderate to severe malnutrition category. Furthermore, statistical analysis shows that there is a significant difference (p = 0.001) between the use of SGA and MIS in assessing nutritional status in patients with hemodialysis.

Conclusion: It can be concluded that there is a difference between the use of SGA and MIS in assessing nutritional status in patients with hemodialysis. Further research, could explore more for the advantages and disadvantages of each instrument, including the level of accuracy and sensitivity.

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1. INTRODUCTION

Kidney disease is often referred to as the "silent killer" because those affected do not experience typical symptoms and only feel pain after entering an advanced stage and their performance decreases. If not treated immediately, this condition can endanger the sufferer's health and even lead to death (Wolfson & Strong, 1996; Verger et al., 2021). In the treatment of chronic kidney failure, there are several kidney replacement therapies that are commonly used, such as peritoneal dialysis, kidney transplantation and hemodialysis (de Mutsert et al., 2009; Yang et al., 2019). According to the United States Renal Data System (2017), approximately 87.3 % of people in the United States begin renal replacement therapy with hemodialysis, while 9.6% use peritoneal dialysis. Hemodialysis is a form of treatment used in patients with chronic kidney disease to maintain life (Aggarwal et al., 2018; Wiliyanarti & Muhith, 2019).

In this procedure, kidney function is replaced by a device called a dialyzer or "artificial kidney", where substances dissolved in the blood are transferred to

dialysis fluid or vice versa (Wahyuni et al., 2018). One of the problems faced by patients who routinely undergo hemodialysis is high levels of malnutrition, which is associated with an increased risk of morbidity and mortality (Brunner et al., 2010; Barril et al., 2023). According to a study by Yang et al. (2019), 10-70% of chronic kidney failure sufferers experience protein energy deficiencies, while 25-75% of patients with hemodialysis experience nutritional deficiencies. Another prediction states that 50%-70% of dialysis sufferers experience signs and symptoms of malnutrition. This is evidenced by poor nutritional status when sufferers begin to require dialysis which can trigger an increase in mortality during dialysis (Mailani & Andriani, 2017).

Malnutrition can be caused by various factors, including kidney disease itself or the dialysis treatment being carried out, such as anorexia, uremia, underlying diseases, biological changes that affect the anabolic and catabolic balance, disorders of amino acid metabolism and loss of nutrients and vitamins during dialysis. During dialysis, some nutrients such as proteins, vitamins and minerals dissolve in water, while other nutrients such as folic acid, vitamin B, vitamin C and iron dissolve in the dialysis solution. This disease requires immediate treatment because the dialysis process is repeated and lasts a long time (Kovesdy et al., 2013; Smolin & Grosvenor, 2019).

Various methods can be used to assess nutritional status, for example by paying attention to nutritional history, carrying out anthropometric measurements, examining blood biochemical parameters and evaluating organ function and functional state (Capriotti & Frizzell, 2016; Sri Wardani, 2022; Mustikaria et al., 2023) The recommended assessment methods for assessing the nutritional status of chronic kidney disease patients are SGA (Subjective Global Assessment), serum albumin levels , body mass index (BMI) measurements and MIS (Malnutrition Inflammation Score). However, each hospital may use different combinations of these methods such as SGA, anthropometry, and biochemical examination depending on applicable practice and practices (Wahyuni et al., 2018; Aditia et al., 2022).

ASPEN (American Society of Parenteral and Enteral Nutrition) recommends the use of SGA (Subjective Global Assessment) as a tool to assess the nutritional status of treated patients. SGA is considered the gold standard because apart from physical appearance it also takes into account the patient's history (Kalantar-Zadeh et al., 2001; Kovesdy et al., 2013). Apart from using SGA (Subjective Global Assessment) as a tool to assess the nutritional status of chronic kidney disease patients, MIS (Malnutrition Inflammation Score) can also be used as another method. MIS uses a scoring system to assess PEW (Protein Energy Waste) and inflammatory conditions in patients.

Based on an interview with the RSAU director, Dr. M. Salamun, it is known that the MIS (Malnutrition Inflammation Score) tool to assess nutritional status is used in the hemodialysis room. However, nutritional status assessment using SGA (Subjective Global Assessment) is usually carried out at RSAU Dr. M. Salamun on inpatients, never carrying out special SGA screening on outpatients. Considering this, researchers are interested in conducting further research by comparing nutritional status assessments using SGA (Subjective Global Assessment) and MIS (Malnutrition Inflammation Score) on the nutritional status of patients with hemodialysis.

2. METHODS

Study Design

This research uses a cross-sectional research design. The approach used is quantitative with a comparative hypothesis type. Variables of this study were nutritional status in patients with hemodialysis with Subjective Global Assessment (SGA) tool, and Malnutrition Inflammation Score (MIS) tool.

Population, Samples, and Sampling

The population of this study were sufferers of chronic kidney failure in the hemodialysis room at RSAU dr. M. Salamun. The number of samples in this study was 75 people. Samples were taken using a non-probability sampling method with a total sampling technique, which means that all chronic kidney failure patients who meet the criteria was the research samples

Instruments

The instruments used in this research were SGA (Subjective Global Assessment) and MIS (Malnutrition Inflammation Score) to evaluate nutritional status in patients with hemodialysis. SGA is a questionnaire consisting of seven questions in the form of anamnesis and physical examination. These questions include information about disease diagnosis, body weight during the last 6 months and last 2 weeks, food intake, gastrointestinal symptoms, and functional capacity. The physical examination involves assessing subcutaneous fat loss, muscle wasting, and swelling. Patients are assigned a score based on the results reviewed, and the SGA score can indicate the patient's nutritional status. The SGA score includes three categories: good/normal nutrition (6-7 in most categories), poor/moderate nutrition (rating 3-5, no evidence of normal nutritional status or significant weight), or severe malnutrition (rating 1-2 , especially the physical category/signs of malnutrition).

MIS (Malnutrition Inflammation Score) MIS is a questionnaire used to assess energy-wasting proteins (malnutrition) and inflammation in patients with hemodialysis. The MIS questionnaire consists of 10 questions that include information about medical history (weight changes, food intake, gastrointestinal complaints, function, comorbidities) and health examination (loss of subcutaneous fat, loss of muscle

mass). Apart from that, there are three additional questions that are not included in the SGA, namely about BMI, serum albumin, and total iron binding capacity (TIBC). The MIS score indicates the severity of malnutrition and inflammation, with four levels ranging from 0 (normal) to 3 (severe malnutrition). The MIS total score can be used to categorize patients into four categories: no malnutrition (0-5), mild malnutrition (6-10), moderate malnutrition (11-20), and severe malnutrition (<20).

Procedure

This research was conducted on 30 March to 8 April 2023 at RSAU dr. M. Salamun. All the respondents identified which match to our inclusion criteria when they present for hemodialysis sessions. After that, we provide an explanation to the patient and family about the purpose of the research and ask for permission to participate via the informed consent form. Conduct a nutritional status assessment using SGA and review patient medical records to gather information about disease diagnosis. Then we ask questions directly on the SGA form regarding body weight over the past 6 months and 2 weeks, food intake, gastrointestinal symptoms, and functional capacity. Perform a physical examination to assess for loss of subcutaneous fat, muscle wasting, and swelling. Provide an SGA score based on the results of the assessment. Then we continue with the assessment of nutritional status using MIS: Using the MIS questionnaire consisting of 10 questions to assess energy-wasting and inflammatory proteins. Complete questions regarding changes in body weight, food intake, gastrointestinal complaints, function, comorbidities, loss of subcutaneous fat, loss of muscle mass, BMI, serum albumin, and total iron binding capacity (TIBC). Lastly calculate the MIS score based on the patient's answers.

Data Analysis

After collecting data from all respondents, record the SGA and MIS scores of each patient. Bivariate analysis in this study used the Mann Whitney statistical test to test the relationship between the independent variables (SGA and MIS) and the dependent variable (nutritional status of patients with hemodialysis).

3. RESULTS

From table. 1 above, it can be observed that the majority of respondents were in the age range of 46-55 years (29.3 %), while the majority of respondents were men with a total of 39 respondents (52.0%). In addition, there were 36 respondents (48.0 %) who had undergone hemodialysis for more than 24 months.

Based on table 2 above, it can be seen that the results of research using SGA (Subjective Global Assessment) show that 18 patients with hemodialysis (24.0%) have good nutritional status, while 50 patients with hemodialysis (66.7%) have moderate nutritional status, and 7 patients with hemodialysis (9.3%) had poor nutritional status.

From table 3 above, it can be concluded that the total number of respondents in this study was 75 people. The results of research using MIS (Malnutrition Inflammation Score) showed that 2 patients with hemodialysis (2.7%) did not experience malnutrition, 24 patients with hemodialysis (32.0%) experienced mild malnutrition, 48 patients with hemodialysis (64.0%) experienced moderate malnutrition, and 1 hemodialysis patient (1.3%) experienced severe malnutrition.

Based on the results of the Mann-Whitney statistical test, a p-value of 0.001 (p<0.005) was

Table 1. The characteristics of respondents

Characteristics	n	%
Age		
17-25	1	1.3
26-35	8	10.7
36-45	15	20.0
46-55	22	29.3
56-65	18	24.0
> 65	11	14.7
Gender		
Man	39	52.0
Woman	36	48.0
Duration of Hemodialysis		
< 12 months	21	28.0
12-24 months	18	24.0
> 24 months	36	48.0

Table 2. Nutritional status using SGA (Subjective Global Assessment) in patients with hemodialysis

Subjective Global Assessment	n	%
Good nutrition	18	24.0
Moderate nutrition	50	66.7
Malnutrition	7	9.3
Total	75	100.0

Table 3. Nutritional status using MIS (Malnutrition Inflammation Score) in patients with hemodialysis.

Malnutrition Inflammation Score	n	%
Not malnourished	2	2.7
Mild malnutrition	24	32.0
Moderate malnutrition	48	64.0
Severe malnutrition	1	1.3
Total	75	100.0

Table 4. Comparison of Nutritional Status Assessment using SGA (Subjective Global Assessment) with MIS (Malnutrition Inflammation Score)

SGA	MIS			
	Not Malnourished	Severe Malnutrition	Total	P-value
	n (%)	n (%)	n (%)	
Good Nutrition	25 (36.8%)	43 (63.2%)	68 (90.7%)	
Malnutrition	1 (14.3%)	6 (85.7%)	7 (9.3%)	0.001
Total	26 (34.7%)	49 (65.3%)	75 (100%)	

found, which shows that there is a significant difference between the use of SGA (Subjective Global Assessment) and MIS (Malnutrition Inflammation Score) to evaluate the nutritional status of patients with hemodialysis at RSAU Dr. M. Salamun

4. DISCUSSION

From the results of the Mann-Whitney statistical test can be concluded that there is a significant difference between SGA (Subjective Global Assessment) and MIS (Malnutrition Inflammation Score) in assessing the status of nutrition in patients with hemodialysis. The use of SGA in assessing nutritional status showed that 18 people (24%) had good nutritional status, 50 people (66.7%) had moderate nutritional status, and 7 people (9.3%) suffer from malnutrition. On the other hand, the use of MIS in assessing nutritional status showed that 2 people (2.7%) did not experience malnutrition, 24 people (32.0%) experienced mild malnutrition, 48 people (64.0%) experienced moderate malnutrition, and 1 people (1.3%) experienced severe malnutrition.

Assessment of nutritional status using SGA shows better results in terms of simplicity than MIS. This is due to because SGA can be used by all patients, regardless of their socio-economic status, whether from upper or lower classes. Apart from that, there are three additional questions that are not included in the SGA, namely about BMI, serum albumin, and total iron binding capacity (TIBC) (Diaz-Martinez et al., 2019). Body Mass Index (BMI) is a simple method used to assess the nutritional status of an individual (Bhattacharya et al., 2019). TIBC was an independent biomarker of muscle loss in HD patients, considering iron status, inflammation, oxidative stress, and malnutrition (Ikeda-Taniguchi et al., 2022). Serum visceral proteins such as albumin and prealbumin have traditionally been used as markers of the nutritional status of patients (Keller, 2019). It can be concluded that in terms of measurement accuracy, MIS shows better results than SGA becuase of additional questions in MIS suc as : BMI, serum albumin and TIBC, have an important role in measuring nutritional status.

According to research conducted by Bharadwaj et al. (2016), with the title "Malnutrition: Laboratory Markers VS Nutritional Assessment" it can be concluded that there is no standard method for screening and diagnosing patients with malnutrition, which causes confusion and various practices among doctors throughout the world. However, it was explained that the main consensus in determining the validity of nutritional status is that laboratory markers are unreliable, they are popular because they offer objective and quantitative results. However, laboratory markers should only be used to complement the findings of a thorough physical examination. Additionally, serum proteins such as albumin are better for detecting inflammatory conditions than malnutrition, this method is non-invasive and relatively cost-effective.

From the research results of Serón-Arbeloa et al. (2022), with the research title "Malnutrition Screening and Assessment" that nutritional screening is defined in the same way according to ASPEN (American Society of Parenteral and Enteral Nutrition) and ESPEN (European Society for Clinical Nutrition and Metabolism) as a step to identify people who experience deficiencies malnourished or at risk of malnutrition, to determine whether a detailed nutritional assessment is necessary. The requirements for a nutritional risk detection tool are that it must be fast and easy to use, economical, standardized and validated. The screening method should cover at least 3 aspects: weight loss, inadequate nutrition, and functional capacity.

Based on the conditions that have been explained, the researchers' assumptions show that the majority of patients with hemodialysis at the hospital have a socio-economic status that is in the lower to middle class. Therefore, SGA is the right choice because it can be used by all patients, both those from upper class and lower class socioeconomic status. This finding is in line with research by Bharadwaj et al. (2016), "Malnutrition: Laboratory Markers VS Nutritional Assessment" which states that malnutrition is an important risk factor for morbidity and increased health care costs. Therefore, a physical examination is better for determining nutritional status than laboratory markers, because laboratory markers such as albumin and prealbumin (transthyretin) are only used as a complement to a physical examination and cannot be used as a reference that someone is experiencing malnutrition.

However, these findings contrast with the results of research conducted by Wahyuni et al. (2018), with the title "Effectiveness of Using the Nutritional Status Assessment Format using SGA (Subjective Global Assessment) and MIS (Malnutrition Inflammation Score) in patients with hemodialysis at RSAU dr.

Esnawan Antariksa Jakarta 2017" the results of this study stated that the use of SGA and MIS in assessing nutritional status did not show a significant difference. Both are considered equally effective in assessing nutritional status in patients with hemodialysis.

Contrary to Avesani et al. (2022), entitled "A Comparative Analysis of Nutritional Assessment Using Global Leadership Initiative on Malnutrition Versus Subjective Global Assessment and Malnutrition Inflammation Score in Maintenance Hemodialysis Patients" found that the MIS score had a significantly higher correlation with nutritional status actual patient outcomes compared with conventional SGA. Researchers speculate that the MIS score includes three factors that are known to predict mortality, namely body mass index, serum albumin, and serum transferrin

CONCLUSION

The results of this study concluded that there was a significant difference in the assessment of nutritional status using SGA and MIS in hemodialysis patients at the military hospital in West Java - Indonesia. Further research, could explore more for the advantages and disadvantages of each instrument, including the level of accuracy and sensitivity in measuring the nutritional status of patients with various disease.

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