Malnutrition-Inflammation Score in Hemodialysis Patients

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Article information	Abstract
  *Corresponding author at: Nursing Research Center, Research and Technology Deputy, Golestan University of Medical Sciences, Gorgan, Iran. E-mail: ebrahimzadeh1358@gmail.com	**Background**: Malnutrition is a prevalent complication in patients on maintenance hemodialysis. Malnutrition-inflammation score (MIS), comprehensive nutritional assessment tool, as the reference standard was used to examine protein-energy wasting (PEW) and inflammation in hemodialysis patients. **Materials and Methods**: In this descriptive- analytical study, 48 hemodialysis patients were selected with random sampling. All the patients were interviewed and the MIS of the patients was recorded. This new comprehensive Malnutrition-Inflammation Score (MIS) which involves 7 components from the SGA and the 3 additional non-SGA components of body mass index, serum albumin, and total iron-binding capacity (TIBC) has 10 components, each with four levels of severity, from 0 (normal) to 3 (very severe). These scores were compared with anthropometric measurements; laboratory measures. Data was analyzed with Chi-square and t-tests and Pearson correlation coefficient. **Results**: In this study 25% of patients on hemodialysis were normal nourished, 54.3% of patients were mild malnourished, 20.8% were moderately malnourished and no one of them were not sever malnurished. Pearson correlation coefficients between MIS score and age (r=+0.332) was significant. There was no correlation between the malnutrition score and sex Chi-square test showed significant correlation between MIS score and dialysis period $\geq$50 months (χ^2=9.09). **Conclusion**: In this study, no one of patients has severed malnutrition, and most of them were assigned to the mildly/moderately malnourished rating. On other hand, most of patients are the well-nourished. Correlation between MIS score and age and dialysis period was significant.

Introduction

Chronic renal failure is the pathophysiologic process that has multiple causes and leads to reduced progressive number and performance of nephrons and finally the patients lead to distal renal failure [1]. More than 60 million worldwide people lose their lives annually due to the risk of kidney failure. According to the statistics, 1200 to 1600 people of Iran are diagnosed with this disease annually [2]. One of the common problems of chronic dialysis patients Protein-Energy Malnutrition (PEM). Because malnutrition is associated with deterioration of the disease, nutritional management of dialysis patients is a therapeutic strategy. Nutritional assessment is a basic and necessary process in the nutritional management of these patients. To assess the nutritional status of dialysis patients in various ways, including anthropometric measurements, biochemical parameters, performance evaluation and a comprehensive evaluation of diet or the Subjective Global Assessment method (SGA) is used [3].

The combined of all of these reliable and valid methods is known as a standard index system of precise malnutrition-inflammation) score (MIS: Malnutrition Inflammation Score) with. Several studies have been conducted in this area, internal and external [4, 5]. This study aimed to evaluate the score of malnutrition-inflammation and its relation to duration of dialysis patients in hemodialysis patients, Motahari Hospital, Gonbad-e-Kavoos, Iran.

Materials and Methods

In this cross-sectional study, from 60 patients of Motahari hospital dialysis center, 48 patients were randomly selected. Persons should be at least 18 years of age and at least 8 weeks of initiation of dialysis in the past and were able to interview and communicate and have no history of severe emotional disorders such as schizophrenia. The research was conducted based on the instructions approved by the Golestan University of Medical Sciences for the work with dialysis patients. For each patient malnutrition-inflammation questionnaire and some laboratory and demografic data that its reliability and validity had been examined previously in many studies, was completed [6-8]. The questionnaire included the patient's name, age, sex, ethnicity (Turkmen, Persian, Baluchi, Sistani, and Turks), occupation (unemployed,

housewives, workers and farmers, government employees, managers and senior staff, work independent employer), the etiology of the disease (hypertension, glomerulonephritis, diabetes, urinary tract stones, pyelonephritis, and congenital cystic kidney disease, lupus erythematosus, obstructive disease, trauma, or unknown), history of dialysis time (referring to the patient's medical records) Weight and height (anthropometric measurements), blood urea nitrogen, cholesterol, triglycerides, sodium, phosphorus, CRP capacity, iron saturation (TIBC), Iron (measured in vitro) and malnutrition-inflammation score. Inflammation score has 10 questions including SGA-7 questions and 3 other items that is body mass index, serum albumin and iron saturation capacity (TIBC) [6, 8].

SGA questions are weight loss during the previous 6 months, symptoms of gastro-intestinal tract, such as anorexia, nausea, vomiting, diarrhea, food intake, functional capacity (related to power failure), the history of dialysis, loss of subcutaneous fat in the mild arm muscle area and arm muscle area of the lateral line of the body and the muscles in the shoulder and quadriceps muscle of the thigh. Body mass index in four state ≥ 20, 18-19.9, 16-17.99 and <16 Kg/m^2, serum albumin, in the four-state ≥ 4, 3.9-3.5, 3.4-3 and <3 g/dl, and TIBC in four state ≥ 250, 200-249, 199-150 and <150 g/dl was measured. So the 10 questions MIS score, each with four status 0 (normal) to 3 (most severe) is your total score, score 0 (normal) to 30 (severe malnutrition). Boundary point score (cut off) was set 6, because the screening tool must be able to identify more patients at risk of malnutrition [7, 8].

Dry weight measurements (with little clothing as possible) within 10-20 minutes after dialysis session using Seca scales (Made in Germany) with accurately ±100 g. The weight and body mass index (Kg) is calculated by weight (Kg) divided the square of height (m) patients BMI values based on reference standards was divided in six groups: underweight (less than 19.9 Kg/m^2), normal (20-24.9 Kg/m^2) and overweight (25-29.9 Kg/m^2), grade I obesity (30-34.9 Kg/m^2), grade II obesity (35-39.9 Kg/m^2) and grade III obesity (greater than 40 Kg/m^2 [9]. To determine the biochemical parameters of the patients, 10 cc fasting blood was taken by laboratory technician immediately after dialysis.

All experiments were performed in the hospital laboratory. Using the blood creatinine was measured with JAFEE test, CRP with agglutination method, BUN with manual colorimetric method cholesterol and triglycerides were determined by photometry using a diagnostic kit (all kits were tested at company construction) [10]. Anthropometric indicators were measured by experienced nurse. Questionnaires were completed by the researcher during the interviews. Information obtained from the patients was analyzed using SPSS-11.5 software and statistical tests of quantitative variables (One-Way ANOVA and then Tukey test and Pearson correlation and Chi-square test). Statistical significance of less than 0.05 was considered acceptable.

Results

A total of 48 patients studied, 12 patients (25%) had good nutritional status, 26 patients (54.2%) with mild malnutrition, 10 patients (20.8%) had moderate malnutrition and none were severe malnutrition. Mean of patients MIS score was 9.31±3.91. Malnutrition rates in males and females were not significantly different. There was positive and significant relationship between age and MIS score (p=0.035). There was also a significant correlation between the level of education and MIS score (p=0.042). Chi-square test showed also significant effect of dialysis duration less than 50 months, to incidence of malnutrition was (χ^2=9.09, p=0.017). A significant positive Pearson correlation between MIS score and the serum calcium and serum iron results (r=0.336). A significant relationship was not found with other indicators, such as blood cholesterol and triglycerides and CRP. According to table 1 the age mean of malnuritied patients significantly higher than those with normal nutritional status and educational level in normal subjects was higher than that of people with malnutrition (Table 1).

Table 1. Mean ± SD of quantitative factors in normal and malnourished patients based on MIS

Malnutrition Index quantitative factors	Yes Mean±SD	No Mean±SD	p-Value
Patient age (yr)	49.50 ±17.06	41.18 ±17.69	NS
Knee length (cm)	41.48 ±2.91	41.16 ±3.04	NS
Height (cm)	148.06 ±5.27	146.09 ±4.15	NS
Dialysis duration (yr)	60.58 ±43.54	10.17 ±5.87	0.002
Education (yr)	3.25 ±4.54	7.08 ±5.35	0.019
Hemoglobin (g/dl)	11.23 ±1.85	4.10 ±2.07	NS
Cholesterol (mg/dl)	149.02 ±34.30	154.41 ±28.43	NS
Triglycerides (mg/dl)	141.97 ±55.31	152.16 ±63.42	NS
BUN (mg/dl)	54.31 ±14.47	45.33 ±9.10	NS
Sodium (mg/dl)	140.05 ±4.31	139 ±6.06	NS
Calcium (mg/dl)	8.90 ±0.77	9.63 ±0.73	NS
Potassium (mg/dl)	5.12 ±0.75	5.03 ±0.78	NS
Phosphor (mg/dl)	7.05 ±1.79	6.58 ±1.92	NS
Iron (mg/dl)	179.11±59.81	156.08 ±56.79	NS
Albumin (g/dl)	3.91 ±0.28	3.96 ±0.27	NS
HCT (%)	34.45 ±5.46	31.95 ±6.22	NS
URR[1] (mg/dl)	0.49 ±0.11	0.53 ±0.11	NS
A. CIRC[2] (cm)	28.53 ±6.12	27.33 ±3.56	NS

1. Urinary Reduction Ratio 2. Arm Circomfrence , NS: Not Significant

Discussion

In the present study, based on standard criteria MIS hat is combination of anthropometric, biochemical and SGA, 25% of patients had good nutritional status, 70% mild malnutrition, 20% had mild to moderate malnutrition and none were severe malnutrition, that implies the nutritional status of these patients is acceptable. Tabibi study on 291 hemodialysis patients admitted to hospitals in Tehran, about 54% had mild to moderate malnutrition and others was good nutritional status and none were suffering from severe malnutrition [9]. These results are somewhat was in line with our results. Mean of patients MIS score was 9.31±3.91. In Sweden study, by Klantrzadeh et al. this score was 8.3±4.2 [10].

In this study, MIS score correlated directly with age, it means that the older patients are the less nutrition score. Some studies have found that age has an adverse effect on the incidence of malnutrition [11]. Results in our study may be due to genuine culture of the orient and the and strongly recommend action to the maintenance of elderly patients. Some studies did not show any effect of age on the incidence of malnutrition [12].

The study in Tehran found that the age group 60 years and over in comparison with less than 60 years age group had the higher malnutrition, this can be due to disease later in life and the underlying including infections and psychological disorders like depression and economic or physical disability in the preparation and consumption of food [13]. In our study, positive and significant relation between duration of dialysis and MIS score was found, this result was obtained in other studies [14], and this can be due to progressive and the gradual decline of health status in hemodialysis patients despite continuous dialysis. In our study, education level was inversely related to the incidence of malnutrition. Increased education can upgrade nutrition knowledge, increase household income and thus increase the food purchasing power and finally increase the nutritional status. Education level, effects on employment, occupation and income level and general household economic-social conditions [15]. In other studies, correlation of level of education patients and prevalence of malnutrition in patients has beennot studied [15].

In our study, blood cholesterol and triglyceride levels were not significantly correlated with incidence of malnutrition. It should be noted that in dialysis patients due to endocrine disorders, increased lipid profile is common [16]. In this study, the CRP index (depending on the amount of agglutination) had no significant effect in the incidence of malnutrition. The lack of relationship may be due to a qualitative estimate of CRP levels. While many studies had quantitative estimates of protein CRP showed a significant relation [17]. In our study, on the basis of MIS, about 3/4 of the studied patients had normal or mildly malnourished, others had moderate malnutrition and none severe malnutrition that imply relatively acceptable nutritional status for patients.

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Authors' Contributions
All authors had equal role in design, work, statistical analysis and manuscript writing.

Conflict of Interest
The authors declare no conflict of interest.
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