Nutritional status using ISRNM criteria and MIS of chronic haemodialysis patients at Sanjiwani Gianyar General Hospital

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Abstract. Protein energy wasting (PEW) are common in patients with chronic kidney disease (CKD), especially in patients on chronic dialysis therapy. This cross-sectional descriptive analytic study aims to examine the prevalent of PEW based on The International Society of Renal Nutrition and Metabolism criteria (ISRNM): (anthropometric measurement (BMI=Body Mass Index), biochemical measurement (serum albumin), and muscle mass (mid upper-arm circumference) and Malnutrition Inflammation Score (MIS) tools in calculating prevalent of PEW among haemodialysis patients. This study recruited 71 chronic haemodialysis patients at Sanjiwani Gianyar General Hospital composed of 51 male and 20 female, mean of age is 49.7± 14.7 and most patients (69%) with permanent access AV shunt. Based on The ISRNM criteria of PEW, this study exhibited PEW whilst 66.2% (BMI less than 23 kg/m², serum albumin concentration less than 3.8 g/dl, and mid upper-arm circumference less than 25.5 cm) and 69% patient were malnourished on MIS more than equal to 5 score, respectively. Conclusions: prevalence of PEW in chronic HD patients at Sanjiwani Gianyar General Hospital is high according to ISRNM criteria and MIS. And PEW based on ISRNM criteria were consistently to MIS with kappa 0.468; p<0.001.

1. Introduction
Metabolic and nutritional dearrangements are common in patients with chronic kidney disease (CKD), especially in patients on chronic dialysis therapy. These dearrangements are called protein energy wasting (PEW) of CKD. There are multiple etiologies of PEW including decreased nutrient intake, metabolic acidosis, dialysis associated catabolism, uremic toxins, and comorbid medical conditions such as diabetes mellitus, and cardiovascular disease [1, 2]. PEW affects in 13% to 51% of hemodialysis (HD) patients [3]. Such high prevalence of PEW is of great concern because PEW is an important predictor of morbidity and mortality [3, 4].

The method capable of best identifying protein-energy wasting (PEW) in hemodialysis (HD) patients is controversial. However there is no isolated marker capable of assessing the nutritional status of patients with chronic kidney disease (CKD), because of the several abnormalities inherent in CKD itself [3].
The International Society of Renal Nutrition and Metabolism (ISRNM) was proposed diagnosis of PEW. PEW is defined by presence of low levels of serum proteins, reduced body or fat mass or weight loss with reduced dietary protein and energy intake, and reduced muscle mass and muscle wasting. Routine screening of PEW patients is seldom carried out in dialysis centres beyond monitoring of serum albumin levels. Therefore, a simple and reliable tool would be beneficial for early identification and management of poor nutritional status in hemodialysis patient [2]. NKF KDOQI proposed optimal monitoring of protein energy nutritional status for maintenance dialysis patients requires the collective evaluation of multiple parameters. SGA is recommended because it gives a comprehensive overview of nutritional intake and body composition include a rough assessment of muscle mass and fat mass in maintenance hemodialysis patient [5]. Other potential tool for assessment PEW in chronic HD patient is malnutrition inflammation score (MIS), a four point parts denote the nutritional status [6]. Thus, we assessed the nutritional status of HD patients in Sanjwani General Hospital by use both of two methods to identify the conformity of ISRNM criteria and MIS.

2. Material and methods

2.1. Patient eligibility
The study comprised of 71 HD patients twice weekly in Sanjwani Gianyar General Hospital. The recruited patients were above 18 years old who had undergone dialysis for at least 3 months. Hospitalized dialysis patients and patients on any kind of nutritional support were excluded from this study. The HD patients were measured for their height and post-dialysis weight using the electronic column scales (SECA 206, Germany). The BMI was then calculated using the Weight (kg) / Height x Height (m²) formula. Identified patients gave informed consent prior to the study initiation and patients’ anonymity was maintained.

2.2. Biochemical measurements
Biochemical measurements were obtained retrospectively from the patients’ medical records based on the routine blood tests performed by the in-house hospital laboratories. Patients were required to fast 12 hours prior to blood collection by the trained hospital staff. Biochemical parameters obtained for analysis included the serum urea, serum creatinine, serum albumin, serum iron (SI) and serum TIBC. Transferrin saturation (T sat) was calculated from SI/TIBC x 100%

2.3. ISRNM
The ISRNM recommended the diagnosis of PEW involves 4 main categories: biochemical criteria, low body weight, reduced total body fat or weight loss; decrease in muscle mass; and low protein or energy intake. At least 3 of the 4 criteria (and at least 1 test result in each of the selected categories) must be satisfied for diagnosis of PEW. The proposed criteria for diagnosis of PEW were adapted from Fouque et al. Percentage of the studied dialysis patients that fulfilled 3 out of the 4 criteria were computed and identified as malnourished.

2.4. MIS
Malnutrition Inflammation Score (MIS), a 4-point scale quantitative nutrition screening tool consists of four main parts: patient’s related medical history, physical examination, BMI and laboratory parameters. Score 0 of the MIS in each part denotes normal nutrition status while score 3 denotes severe nutritional deficit [7]. The sum of all components ranges from 0 to 30 where score 0 denotes normal nutrition status and score 30 denotes severe level of malnutrition and inflammation. Number of patients scoring lesser than 5 score were classified as normal nutrition status while number of patients scoring higher than equal to 5 score) were classified as malnourished.
2.5. Statistical analysis
Data was analysed using the SPSS version 21 (SPSS Inc., Chicago, IL, USA). Parametric data was presented as mean ± SD and nonparametric data was presented as percentage of patients (%).

3. Results
This study recruited 71 chronic hemodialysis patients that comprises of 51 male and 20 female. All of the patients have undergone HD twice weekly, while duration of HD were 4.5 hour per session and most of the patient with permanent access (AV shunt). Table 1. Shown the mean age were 49.70 ± 14.76, mean duration of HD were 47.28 ± 25.37 month, BMI 22.49 ± 3.84 kg/m², respectively.

| Characteristic                  | Mean   | SD     |
|--------------------------------|--------|--------|
| Age (years)                    | 49.70  | 14.76  |
| Duration of HD (months)        | 47.28  | 25.37  |
| BMI (BW/Height²)               | 22.49  | 3.84   |
| MUAC (cm)                      | 28.19  | 3.88   |
| Hemoglobin (mg/dl)             | 9.94   | 1.57   |
| Ureum (mg/dl)                  | 111.89 | 37.38  |
| Serum creatinine (mg/dl)       | 9.54   | 3.24   |
| Albumin (mg/dl)                | 3.96   | 3.37   |
| SI (µg/dl)                     | 110.0  | 62.22  |
| TIBC (µg/dl)                   | 270.39 | 57.68  |
| T Sat (%)                      | 42.36  | 25.32  |

Abbreviation: BMI, body mass index; BW, body weight; MUAC, Mid upper arm circumference, SI, Serum iron; TIBC, Total iron binding capacity; T Sat, Transferrin’s saturation.

Prevalence of PEW were high that similar based on two screening tools of malnutrition’s. On the ISRNM criteria, this study obtained 47 (66.2%) individuals were determined as a malnourished and 49 (69%) of individuals identified as malnourished based on MIS.

Figure 1. Prevalence of malnourished chronic haemodialysis patients by ISRNM criteria and MIS.
Table 2. Consistency of malnutrition patients identified by ISRNM and MIS on identifying PEW (malnutrition) of chronic haemodialysis patients.

|                  | ISRNM         | Total        |
|------------------|---------------|--------------|
|                  | malnourished  | non-malnourished |         |
| MIS malnourished | 40 (56.34%)   | 9 (12.67%)    | 49 (69.01%) |
| non-malnourished | 7 (9.86%)     | 15 (21.12%)   | 22 (30.99)  |
| Total            | 47 (66.20%)   | 24 (33.80%)   | 71 (100%)   |

This table 2 showed that this study obtained 71 patients, 40 (56.34%) were consistently identified as malnourished by ISRNM and MIS and 15 (21.12%) were consistently identified as non-malnourished. Out of those patients, 9 (12.67%) were not diagnosed as malnourished by ISRNM criteria and MIS using kappa statistics. It was significantly consistent in Kappa 0.486 with p value <0.001.

4. Discussion

In the present study we examined 71 patients of chronic HD consist of 51 male and 20 female. The findings of this study that chronic haemodialysis patients is more common in 45-64 years age group (43.7%) with mean 49.7 ±14.76 years. This prevalence of age groups is less than Indonesian renal registry report (56.77) %, however the age groups prevalence is similar to Liman HL, et al, in Nigeria tertiary hospital with mean age 45 + 11.2 years [8, 9].

Protein energy wasting (malnutrition) is a common problem in chronic haemodialysis patients as identified in this study. This study used the criteria for assessment of PEW that recommended by ISRNM and compared to the new potential tool criteria (MIS). This study examined PEW with ISRNM criteria and MIS criteria and then search the consistency of both ISRNM and MIS. The present study obtained prevalence of malnutrition 66.2% and 69% based on ISRNM criteria and MIS respectively. There were significant consistency between prevalence of malnourished based on ISRNM criteria and MIS with Kappa 0.486 and p value <0.001.

This study obtained prevalence of malnutrition is high that similar to other cross sectional study that used MIS or ISRNM criteria. Basaleem, et al, in Saudi found prevalence of PEW among 50 patients chronic HD based on MIS were 70 % [10]. Harvinder et al, in Malaysia obtained 59 % of 155 chronic HD patients were malnourished by ISRNM and 73 % by DMS [7]. The study have undergone in Mexican by Gonzalez-Ortiz et al, 2015 examined 45 patients chronic HD and obtained MIS was consider adequate when compared to BNI (Bilbrey Nutritional Index) with $\kappa =0.585$; $p<0.001$ [11]. PEW is the great concern in chronic haemodialysis patients, because malnutrition are consequence to morbidity and mortality.

The limitations of our study were its sample size and its cross-sectional, single centre design. And the authors declare that there are no conflicts of interest related to the contents of this article.

5. Conclusions

PEW is identified high prevalence in this study based on both ISRNM criteria and MIS. Both of these could be used as nutrition screening tools of dialysis patients especially those undergoing HD. MIS is a more complete and practical tool to be utilised in the dialysis settings.

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