Comparison of Nutritional Assessment Scores using integrative scoring systems for Nutrition Interventions in End Stage Renal Disease Patients on Maintenance Haemodialysis at a Tertiary Health Care Centre

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Malnutrition is significantly prevalent in ESRD patients requiring haemodialysis and is associated with increased morbidity and mortality. The reasons for malnutrition in ESRD are multifactorial and include anorexia due to uremia causing reduced food intake, reduced absorption of nutrients due to odematous gut, metabolic acidosis, protein loss during dialysis, ongoing active inflammation, oxidative stress, presence of pro-inflammatory cytokines and hormonal disorders. Impaired sense of taste, many dietary restrictions and depression are also important factors causing reduced appetite and hence malnutrition. The procedure of dialysis itself contributes to malnutrition inducing general catabolic state due to protein catabolism and gradual impairment of protein synthesis.

Protein energy wasting (PEW) is the term proposed which describes the state of decreased stores of protein and energy fuels (body protein and fat masses) in CKD patients.

PEW can be diagnosed in clinical practice using following criteria…

1. Biochemical Measures (Serum Albumin, Transferrin, Cholesterol)
2. Measures of body mass (BMI)
3. Measures of muscle mass (Total muscle mass , Mid arm circumference)
4. Measures of dietary intake (Dietary proteins & energy intake)

A useful tool for assessment of the nutritional status of patients is the use of standardized questionnaires evaluating the nourishment levels. These are easy, quick and don't require any special equipment and can be used by medical personnel and dieticians.

Assessment of PEW can be done by Integrative nutritional scoring systems. These are…

1. Subjective global assessment of nutrition (SGA),
2. Global Leadership Initiative for Malnutrition (GLIM)
3. Malnutrition Inflammation Score (MIS)

Subjective Global Assessment (SGA) of Nutrition: It is a practical, inexpensive tool used in clinical practice for assessing nutrition. The subjective global assessment (SGA) is a nutrition assessment tool that refers to an overall evaluation of a patient's history and physical examination and uses structured clinical parameters to diagnose malnutrition. SGA score consists of seven features: weight change, dietary intake, GI symptoms, functional capacity, co-morbidity, subcutaneous fat and signs of muscle wasting. Each component has a score from 1 (normal) to 5 (very severe).They are combined subjectively to form a global rating of well nourished, moderately malnourished and severely malnourished.

Malnutrition Inflammation Score (MIS): It has a total of ten components. 70% indexes are common with SGA questionnaire and remaining 30% are serum albumin, total iron binding capacity, and body mass index. The sum of all components ranges from 0-30. Higher score indicates more severe degree of malnutrition and inflammation.

Global leadership Initiative for Malnutrition (GLIM): GLIM started in 2016 as an initiative of the 4 big clinical nutrition societies in the world (ESPEN, ASPEN, FELANPE and PENSA) to create a consensus on malnutrition definition. The top five ranked criteria included –three phenotypic criteria (non-volitional weight loss, low BMI and reduced muscle mass) and two etiologic criteria (reduced food intake, and inflammation or disease burden). To diagnose malnutrition at least one phenotypic criterion and one etiologic criterion should be present. Phenotypic metrics are used for grading the severity of malnutrition and etiologic criteria is used to guide interventions and anticipated outcome.

This study aims to find the utility of these scores in our patient population.

Study Design:

Aims & Objectives:

1. To find the SGA, GLIM and MIS malnutrition scores in assessing the status of malnutrition in ESRD patients receiving maintenance haemodialysis at our tertiary health care centre.
2. To find the changes in these scores after the nutritional intervention in these patients
3. To compare the efficacy of these three scores in nutritional assessment.

After seeking Ethics committee permission, we carried out this study at the artificial kidney unit of a tertiary health care centre.

Eligibility criteria:

1. Patients belonging to both sexes
2. Age group between 18 to 75 years,
3. Patient should be diagnosed as end stage renal disease, should be triple HHH (Hep B, Hep C and HIV) negative and should be receiving maintenance haemodialysis through AV fistula or vascular access
4. Patient should be willing to give consent to participate in the study.

After fulfilling the eligibility criteria and taking their informed consent , total 55 patients - 38 males and 17 females were recruited in the study. Each patient was evaluated on the day of recruitment and then monthly till 6 months.

Methodology:

On the day of recruitment , history, clinical examination and anthropometric details were entered in the proforma and relevant laboratory studies (CBC, Electrolytes, RFT, Ca, PO4, Uric Acid, Serum Proteins -Albumin and Globulin, Blood Sugar, Iron Studies, Lipid Profile) were carried out and results were entered in the proforma.

Also each patient's SGA, GLIM and MIS scores were calculated according to the standardized criteria mentioned above and they were tabulated.

With the help of a qualified dietician and according to the patient's dietary requirements, nutritional interventions were done by suggesting dietary modifications and providing diet charts for these patients.

Later on, compliance was assessed monthly by short term dietary recalls, food diaries and food frequency questionnaires. All these records were recorded and tabulated.

Those patients who were non-compliant, did not maintain the records or were unable to answer the questionnaire were excluded from the study.

OBSERVATION & RESULTS

Table 1.1: Baseline characteristics of the study population with biochemical parameters & anthropometric measurements

Characteristics	Values
Age (years)	52.58 (23-76)
Sex	Male (38), Female (17)
Weight (kg)	54.69 ± 4.36
Height (cm)	145.11 ± 32.14
Hypertension	45 (81.8%)
Diabetes Mellitus	7 (12.7%)
Miscellaneous	3 (5.5%)
BMI (kg/m²)	21.35 ± 69.7
Serum Albumin	3.8 ± 1.06
Total Proteins (g/dl)	5.5 ± 1.23
CRP (mg/dL)	51.83 ± 13.02
Mid arm circumference (cm)	27.86 ± 82
Waist Circumference (cm)	38.21 ± 83
Ferritin	209.12 ± 12.34

Table 1.2 : Intra and inter group comparison of mean malnutrition score of MIS at different time intervals:

Score	MIS			One-way ANOVA
	Initial	3 months	6 months	P value
	Mean± Standard Deviation			
No malnutrition	37.0 ± 17.11	28.5 ± 09.33	23.0 ± 15.25	0.011 (S)
Moderately nourished	39.9 ± 10.09	32.7 ± 21.09	27.3 ± 09.52	0.020 (S)
Severely malnourished	41.0 ± 09.40	36.0 ± 15.78	33.2 ± 19.16	0.001 (HS)
P value	0.01 (S)	0.04 (S)	0.001 (HS)	

Table 1.4 : Intra and inter group comparison of mean malnutrition score of GLIM at different time intervals:

Score	GLIM			One-way ANOVA
	0 months (Baseline)	3 months	6 months	P value
	Mean± Standard Deviation			
Mildly malnourished	64.0 ± 22.12	61.5 ± 03.21	58.0 ± 13.11	0.51 (HS)
Moderately malnourished	67.5 ± 18.13	62.3 ± 31.00	60.11 ± 11.71	0.17 (NS)
Severely malnourished	68.0 ± 25.12	64.2 ± 15.36	62.0 ± 16.21	0.001 (S)
P value	0.01 (S)	0.001 (HS)	0.001 (HS)	

Table 1.6 : Prevalence of malnutrition in study population according to the different tools at the end of study period:

Prevalence	Number of cases		
	SGA	GLIM	MIS
Mild	42	36	38
Moderate	8	9	11
Severe	5	10	6

Graph 1: Graphical representation of gender wise distribution of CKD in Study population

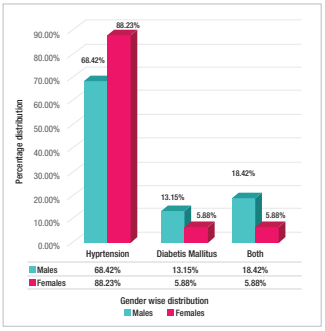


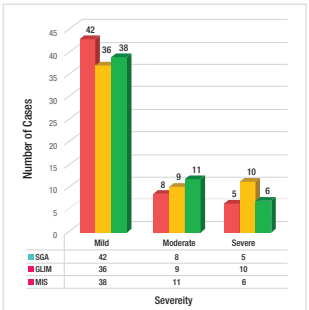
Table 1.3 : Intra and inter group comparison of mean malnutrition score of SGA at different time intervals:

Score	SGA			One-way ANOVA
	0 months (Baseline)	3 months	6 months	P value
	Mean± Standard Deviation			
Well nourished	44.0 ± 27.11	41.5 ± 19.23	33.0 ± 05.15	0.001 (HS)
Mild to moderately malnourished	47.07 ± 3.15	45.7 ± 10.04	34.8 ± 3.52	0.05 (S)
Severely malnourished	59.0 ± 05.32	55.2 ± 05.46	52.0 ± 19.61	0.001 (HS)
P value	0.01 (S)	0.002 (HS)	0.001 (HS)	

Table 1.5 : Intra and inter group comparison of mean malnutrition score of BMI at different time intervals:

Score	BMI			One-way ANOVA
	SGA	MIS	GLIM	P value
	Mean± Standard Deviation			
Initial	28.26 ± 1.21	28.61 ± 2.12	29.32 ± 2.11	0.021 (HS)
3 months	27.5 ± 1.61	29.16 ± 1.82	62.0 ± 16.21	0.32 (NS)
6 months	32.21 ± 0.21	27.21 ± 0.82	30.6 ±1.31	0.001 (HS)
P value	0.001 (HS)	0.42 (NS)	0.03 (S)	

Graph 2: Graph showing prevalence of malnutrition in study population according to the different tools at the end of study period



Conclusions:

- The current study, we used three scales viz. SGA, GLIM and MIS to evaluate the malnutrition status amongst 50 chronic kidney disease patients admitted in our hospital.
- There were 38 Males and 17 Females.
- The mean age group affected was 52.58.
- In our study, hypertension (81.8%) was observed to be a prominent cause for CKD, followed by diabetes mellitus (12.7%)
- The study showed that SGA was a reliable scale when compared to the other two scales.
- The SGA scale was more clinically efficient and was easy to use.
- It showed that it could detect the changes in the trend of nutrition of the patients which may be missed by anthropological assessments and biochemical tests.
- Additionally, it does not take much time to assess the patient using this scale.
- After the interventions which were done at 3 and 6 months, there was a positive relation seen in the form of improvement of the patients and very few of them were found to have severe malnutrition.
- At the end of the study, improvement was seen in serum albumin and total protein levels after intervention.
- SGA and MIS had components to assess the muscle wasting of the patient which makes it better than using the GLIM scale.
- Overall, it was noted that GLIM score did not perform better than 7p-SGA and MIS in diagnosing malnutrition.
- Patients were given adequate knowledge about the importance of having a nutritious diet so as to maintain their body weight as well as including other vital nutrients in their diet..
- • At the end of the study, improvement was seen in serum albumin and total protein levels after intervention.
- Active team participation of the nephrologist, dietician & dialysis technician will further help the patients in getting holistic treatment as well as dietary counselling for the better health outcomes in these patients.
- In conclusion, when you compare the usefulness and practicality of use of the three scores, our study showed that the SGA scoring system was better, easier to use and a reliable method to evaluate the nutrition status in this cohort.

LIMITATION

- The primary limitation was the short follow up in our study.
- The scope of the study is limited to one hospital only and may not cover socioeconomic diversities of the patients in a wider range.