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Original Article

Assessment of Nutritional Status of Patients on the Maintenance Hemodialysis at Tertiary Care Hospital using Malnutrition Inflammatory Score

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ABSTRACT

Objective: To determine the frequency of protein energy wasting among end stage renal disease patients on maintenance hemodialysis.

Study Design: Cross-sectional analytical study.

Place and Duration of Study: Department of Nephrology, Pak Emirates Military Hospital, Rawalpindi Pakistan, from May 2019 to Mar 2020.

Methodology: Two hundered patients diagnosed with end-stage renal disease on maintenance hemodialysis were included in the study. Protein-energy wasting was assessed using the Malnutrition inflammatory score comprising four x components: medical history, physical examination, laboratory parameters and body mass index. Malnutrition inflammatory score was used to categorize protein-energy wasting.

Results: Out of 200 patients with ESRD on maintenance hemodialysis, 73(36.5%) patients had mild, 120(60.0 %) patients had moderate, and 7(3.5%) patients had severe protein-energy wasting. The advanced age group, multiple comorbid (diabetes mellitus, hypertension, ischemic heart disease), and duration of hemodialysis (> 2 years) had a statistically significant association with the protein energy wasting (p-value < 0.05). Protein-energy wasting was also more prevalent in patients with low monthly income (p-value 0.04).

Conclusion: Protein-energy wasting is common among patients with end stage renal disease on maintenance hemodialysis. Old age group, multiple comorbid, and duration of hemodialysis are important risk factors.

Keywords: End-stage renal disease (ESRD), Protein energy wasting (PEW), Malnutrition inflammatory Score (MIS).

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INTRODUCTION

Over the past few decades, there has been an increase in the incidence of chronic kidney disease (CKD) worldwide. It was ranked 27th among the causes of death globally in the 1990s, but in 2010 it rose to 18th among other diseases.[1] In 2013, approximately 1 million people suffered CKD-related death.[2] Mills *et al*. observed that about 387.5 million people in lower-middle-income countries suffer from CKD.[3] The overall frequency of CKD among the Pakistani popu-lation was 21.2%. It ranges from 12.5% to 29.9 %.4 Protein-energy wasting (PEW) is common in endstage renal disease (ESRD)/hemodialysisdependent pa-tients. The estimated global prevalence of PEW in ESRD patients is approximately 18-75 % of patients.[5]

Reduced dietary intake is common in these patients and is a major contributing factor to protein malnutrition.[6] Other factors, including pro-inflammatory state, catabolic state & co-morbidities like cardiovascular disease, Diabetes mellitus, hyperparathyroidism and uremia, result in increased energy metabolism and energy expense.[7] Therefore, evalua-ting nutrition status and inflammation in these patients is important, as it is a strong predictor of mortality.[8] There are various subjective and objective assessment tools to assess PEW in ESRD patients.[9,10]

This study aims to assess the frequency of protein energy wasting among ESRD patients on maintenance HD in a tertiary care setup and to identify its associated risk factors to provide nutritional support to these patients in addition to standard ESRD care.

METHODOLOGY

This was a cross-sectional analytical study carried out at Pak Emirates Military Hospital, Department of Nephrology Pakistan, from May 2019 to March 2020. Approval of the Hospital Ethical Review Committee was taken. Non-probability consecutive sampling technique was used to select patients with ESRD disease on maintenance hemodialysis in the hemodialysis unit PEMH, Rawalpindi. The sample size was calculated using the WHO sample size calculator with an estimated population prevalence of 75%.[5]

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Inclusion Criteria: Patients of age ≥18 years, conscious and alert, on HD for at least ≥6 months and at least having 2 x HD sessions per week were included in the study.

Exclusion Criteria: Patients with physical or mental disability, patients with GCS <12 /15, unable to communicate with the interviewer or patients admitted in critical care requiring organ support were excluded from the study.

Informed written consent was taken from all study participants. Malnutrition inflammatory score (MIS) was used to collect data.

MIS involves four major components: a past medical history of the patient, body mass index (BMI), a detailed general physical and systemic review and laboratory tests - serum Albumin (Alb) and Total iron binding capacity (TIBC).[11]

Detailed history included information regarding recent loss/gain of weight, abdominal symptoms, dietary intake, appetite, functional status, exercise tolerance and comorbid diseases (Hypertension, diabetes mellitus, period and frequency of HD Sessions. General physical examination included assessment of signs of muscle wasting and loss of subcutaneous. Laboratory investigations included serum Albumin and TIBC. The MIS consists of 10 x parameters, of which 70% are subjective and 30% are objective parameters. MIS severity comprises four grades, each ranging from normal (0) to very severe (03).

The total MIS score ranges from 0 to 30, with severe protein energy wasting (PEW) depicted by increased/higher MIS.[11] Online resource, was used to estimate the MIS score of the patients. According to Naini et al. a score of MIS <9 indicates No PEW to mild PEW, moderate PEW is depicted by an MIS of (09–18), and severe PEW is depicted by an MIS (>18).[12] Relevant Data collection, including comorbid, demographic data, socioeconomic factors, frequency of hospital admissions in the last one year, and diet preference, was done on a separate questionnaire.

Statistical analysis was performed using Statistics Package for Social Sciences (SPSS) version 24.0. Characteristics of study participants and distribution of MIS were analyzed using descriptive statistics. Analysis of variables like age, gender, comorbid, socioeconomic data, BMI, HD duration/frequency of HD session was done, and association with MIS severity was assessed with the help of a chi-square test. The *p*-value of ≤0.05 was taken as statistically significant.

RESULTS

A total of 200 patients were assessed in the study. The mean age in the study population was 47.70±8.77 years. Baseline Patient characteristics were shown in (Table-I).

Table-I: Characteristics of Study Participants (n=200)

Characteristics	Frequency (%)
Protein Energy Wasting	
Mild	73 (36.5%)
Moderate	120 (60.0%)
Severe	7 (3.5%)
Age	
Mean±SD	47.70±8.77 years
18-50 yrs	130 (65.0%)
>50 yrs	70 (35.0%)
Gender	
Male	132 (66.0%)
Female	68 (34.0%)
Comorbids	
Hypertension	11 (5.5%)
Diabetes Mellitus	09 (4.5%)
Ischemic Heart Disease	07(3.5%)
Diabetes & Hypertension	173 (86.5%)
Duration of Hemodialysis	
<2 years	67 (33.5%)
2-3 years	110 (55.0%)
>3 years	23 (11.5%)
Frequency Of Hemodialysis	
Twice weekly	150 (75.0%)
Thrice weekly	50 (25.0%)
Body Mass Index	
Underweight (≤18.5)	10 (5%)
Normal (18.5-24.9)	85 (42.5%)
Overweight (25 -29.9)	96 (48.0%)
Obese (≥ 30)	09 (4.5%)
Socioeconomic Status (Income per month)	
<Rs 20,000	36 (18.0%)
Rs 20,000 to 50,000	126 (63.0%)
>Rs 50,000	38 (19.0%)

As per MIS, 73(36.5%) patients had mild PEW, 120 (60.0%) patients had moderate, and 7(3.5%) patients had severe PEW. Older age groups, Multiple comorbid (DM, HTN) and duration of hemodialysis (>2 years) are statistically associated with PEW (*p*-value <0.05). Low socioeconomic class/income was also statistically associated with PEW (*p*-value 0.04). Gender, Frequency of HD per week and BMI were not significant factors in PEW (*p*-value >0.05) (Table-II).

Comparison of hemodialysis duration and malnutrition inflammatory score severity was shown in the Figure. PEW was more common in the advanced age group, patients with multiple comorbid and HD duration >2 years.

Table-II: Patient Characteristics and Malnutrition Inflammatory Score Severity (n=200)

Patient Characteristics	Mild Protein Energy Wasting (n=73) n(%)	Moderate Protein Energy Wasting (n=120) n(%)	Severe Protein Energy Wasting (n=7) n(%)	*p*-value
Age				
18-50 years	55(27.5%)	72(36.0%)	03(1.5%)	0.04
>50 years	18(9.0%)	48(24.0%)	04(2.0%)	
Comorbids				
Hypertension	05(2.5%)	04(2.0%)	0	0.04
Diabetes Mellitus	09(4.5%)	02(1.0%)	0	
Ischemic Heart Disease	03(1.5%)	04(2.0%)	0	
Diabetes &Hypertension	56(28.0%)	110(55.%)	07(3.5%)	
Duration of Hemodialysis				
<2 years	34(17.0%)	32(16.0%)	01(0.5%)	0.03
2-3 years	35(17.5%)	72(36.0%)	03(1.5%)	
>3 years	04(2.0%)	16(8.0%)	03(1.5%)	
Socioeconomic Class (income per month)				
Low (<Rs 20,000)	11(5.5%)	20(10.0%)	05(2.5%)	0.04
Moderate (Rs 20,000-50,000)	50(25.0%)	74(37.0%)	02(1.0%)	
Satisfactory (> Rs 50,000)	12(6.0%)	26(13.0%)	0	
Gender				
Male	49(24.5%)	76(38.0%)	06(3.0%)	0.71
Female	24(12.0%)	43(21.5%)	01(0.5%)	
Hemodialysis Frequency				
Twice Weekly	56(28.0%)	91(45.5%)	03(1.5%)	0.13
Thrice Weekly	17(8.5%)	29(14.5)	04(2.0 %)	
Body Mass Index				
Underweight (≤ 18.5)	06(3.0%)	04(2.0%)	0	0.239
Normal (18.5 – 24.9)	24(12.0%)	59(29.5%)	02(1.0%)	
Overweight (25 -29.9)	39(19.5%)	52(26.0%)	05(2.5%)	
Obese (≥ 30)	04(2.0%)	05(2.5%)	0	

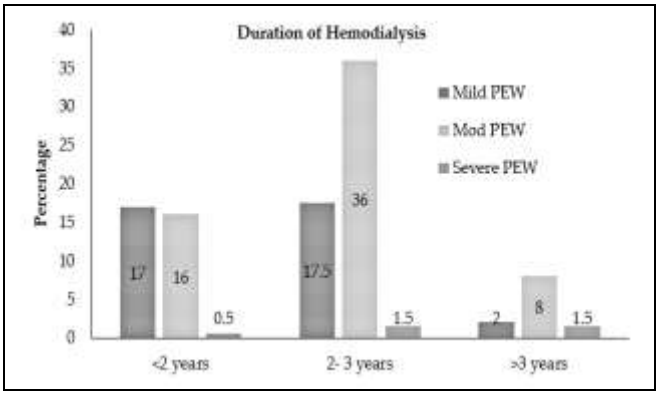

Figure: Comparison of Haemodialysis Duration and Malnutrition Inflammatory Score Severity (n=200)

DISCUSSION

The term malnutrition comprises both overnutrition and undernutrition. As per NICE guidelines, it is characterized by an insufficiency of protein, energy, vitamins and minerals that adversely affects body functions, metabolism or clinical outcomes (CG 32, QS24).[13] The International Society of Renal Nutrition and Metabolism (ISRNM) suggested that the word protein-energy wasting (PEW) is more appropriate to define undernutrition in CKD patients.[14] We used malnutrition inflammatory score as a diagnostic tool in our study. MIS grades are strongly associated with morbidity and mortality in non-HD dependent and HD dependent CKD patients.[15,16] Our results showed mild and moderate PEW was a frequent finding among ESRD patients (35 to 65%). Carrero *et al.* observed that the frequency of PEW is (60–85%) among HD patients.[17] In another study, the frequency of PEW in CKD stage V was (30-70 %).[18]

Important risk factors associated with PEW are advancing age, multiple co-morbidities, low socioeconomic class and increased HD duration. Advancing age has an association with PEW. The mean age in our study was 47.7 years, and severe PEW was seen among patients> 50 years. In a study by Alharbi *et al*. PEW was more frequent among patients with age >55 years.[19] HD duration also impacted nutritional status, as shown in our results. PEW was more frequent among Patients having dialysis vintage greater than 24 months. Most importantly, in our results, multiple comorbid (hypertension and diabetes mellitus along with ESRD) had a significant impact on the health of ESRD patients. Mild to moderate PEW was present in more than 70% of patients having multiple comorbid. A study conducted in Palestine by Omari *et al*. also suggested that multiple comorbid and increased hemodialysis duration are major contributors to PEW in ESRD patients.[20] Other factors like BMI, frequency of hemodialysis and gender were also analyzed in our study, but a statistically significant association between these factors and PEW cannot be established.

PEW is common in CKD patients. Therefore, a multidisciplinary approach with rationalized nutritional interventions based on the severity of renal compromise, comorbid diseases, existing nutritional status and functional disability is required to enhance the quality of care in ESRD/HD patients. Moreover, conditions that enhance protein breakdown (metabolic acidosis, inflammation, recurrent infections) should be minimized.

CONCLUSION

Malnutrition and Protein Energy Wasting (PEW) is a common findings among End Stage Renal Disease patients on maintenance hemodialysis. Advancing age, multiple comorbid and longer duration of hemodialysis are significant risk factors and are statistically associated with Malnutrition /PEW in ESRD patients.

Conflict of Interest: None

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

HBT: Study design, drafting the manuscript, data interpretation, critical review, approval of the final version to be published.

MNAK & RT: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

RK:, MBA & HWK**:** Conception, critical review, drafting the manu-script, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. Lozano R, Naghavi M, Foreman K, Lim S, Shibuya K, Aboyans V, et al. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet 2012; 380(9859): 2095-2128. doi:10.1016/S0140-6736(12)61728-0
2. Abubakar II, Tillmann T, Banerjee A. Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet 2015; 385(9963): 117-171. doi:10.1016/S0140-6736(14)61682-2.
3. Mills KT, Xu Y, Zhang W, Bundy JD. A systematic analysis of worldwide population-based data on the global burden of chronic kidney disease in 2010. Kidney Int 2015 ; 88(5): 950-957.
4. Hasan M, Sutradhar I, Gupta RD, Sarker M. Frequency of chronic kidney disease in South Asia: a systematic review. BMC Nephrol 2018; 19(1): 291. doi:10.1186/s12882-018-1072-5.
5. Hajira B, Manzoor M, Samiullah M, Chawla RK. Effect of dietary counselling on the nutritional status of end-stage renal disease patients. J Pak Med Assoc 2017 ; 67(9): 1327-1330.
6. Ikizler TA, Cano NJ, Franch H, Fouque D, Himmelfarb J, Kalantar-Zadeh K, et al. Prevention and treatment of protein energy wasting in chronic kidney disease patients: a consensus statement by the International Society of Renal Nutrition and Metabolism. Kidney Int 2013; 84(6): 1096-1107.
7. Mafra D, Deleaval P, Teta D, Cleaud C, Arkouche W, Jolivot A, et al. Influence of inflammation on total energy expenditure in hemodialysis patients. J Ren Nutr 2011; 21(5): 387-393.
8. Dekker MJ, Konings C, Canaud B, van der Sande FM, Stuard S, Raimann JG, et al. Interactions between malnutrition, inflammation, and fluid overload and their associations with survival in prevalent hemodialysis patients. J Ren Nutr 2018; 28(6): 435-444.
9. Kalantar-Zadeh K, Kopple JD, Block G, Humphreys MH. A malnutrition-inflammation score is correlated with morbidity and mortality in maintenance hemodialysis patients. Am J Kidney Dis 2001; 38(6): 1251-1263. doi:10.1053/ajkd.2001.29222.
10. Li ZJ, An X, Mao HP, Wei X, Chen JH, Yang X, et al. Association between depression and malnutrition–inflammation complex syndrome in patients with continuous ambulatory peritoneal dialysis. Int Urol Nephrol 2011; 43(3): 875-882. doi:10.1007/s11255-011-9917-x.
11. Kalantar-Zadeh K, Kopple JD, Humphreys MH, Block G. Comparing outcome predictability of markers of malnutrition–inflammation complex syndrome in haemodialysis patients. Nephrol Dial Transplant 2004 ; 19(6): 1507-1519. doi:10.1093/ndt/gfh143.
12. Naini AE, Karbalaie A, Abedini M, Askari G, Moeinzadeh F. Comparison of malnutrition in hemodialysis and peritoneal dialysis patients and its relationship with echocardiographic findings. J Res Med Sci 2016; 21(1): 78-81. doi:10.4103/1735-1995.189695.
13. National Institute for Health and Clinical Excellence. Clinical Guideline 32: Nutrition Support in Adults-Oral Nutrition Support, Enteral Tube Feeding and Parenteral Nutrition. NICE; 2006. Aviable at: https://www.nice.org.uk/guidance/cg32
14. Fouque D, Kalantar-Zadeh K, Kopple J, Cano N, Chauveau P, Cuppari L, et al. A proposed nomenclature and diagnostic criteria for protein–energy wasting in acute and chronic kidney disease. Kidney Int 2008; 73(4): 391-398. doi:10.1056566538/sj.ki.5002585.
15. Amparo FC, Kamimura MA, Molnar MZ, Cuppari L, Lindholm B, Amodeo C, et al. Diagnostic validation and prognostic significance of the Malnutrition-Inflammation Score in nondialyzed chronic kidney disease patients. Nephrol Dial Transplant 2015; 30(5): 821-828. doi:10.1093/ndt/gfu380.
16. Molnar MZ, Czira ME, Rudas A, Ujszaszi A, Lindner A, Fornadi K, et al. Association of the malnutrition-inflammation score with clinical outcomes in kidney transplant recipients. Am J Kidney Dis 2011; 58(1): 101-108. doi:10.1053/j.ajkd.2010.11.027.
17. Carrero JJ, Thomas F, Nagy K, Arogundade F, Avesani CM, Chan M, et al. Global frequency of protein-energy wasting in kidney disease: a meta-analysis of contemporary observational studies from the international society of renal nutrition and metabolism. J Renal Nutr 2018; 28(6): 380-392. doi:10.1053/j.jrn.2018.08.006.
18. Sarav M, Kovesdy CP. Protein Energy Wasting in Hemodialysis Patients. Clin J Am Soc Nephrol 2018 ; 13(10): 1558-1560. doi:10.2215/CJN.02150218.
19. Alharbi K, Enrione EB. Malnutrition is prevalent among hemodialysis patients in Jeddah, Saudi Arabia. Saudi J Kidney Dis Transpl 2012; 23(3): 598-608
20. Omari AM, Omari LS, Dagash HH, Sweileh WM, Natour N, Sa'ed HZ. Assessment of nutritional status in the maintenance of haemodialysis patients: a cross-sectional study from Palestine. BMC Nephrol 2019; 20(1): 92. doi:10.1186/s12882-019-1288-z.