Medica Hospitalia
Journal of Clinical Medicine
Med Hosp 2024; vol 11 (2) : 138–143

OPEN ACCESS

Original Article

Comparison of Protein Energy Wasting Assessment on Quality of Life Regular Hemodialysis Patients

Ni Wayan Sri Wardani, Dewa Gde Agung Budiasa

Departement of Internal Medicine, Medical Faculty and Health Science Warmadewa University, Sanjiwani Gianyar Hospital Bali, Gianyar, Indonesia

p-ISSN: 2301-4369 e-ISSN: 2685-7898
https://doi.org/10.36408/mhjcm.v11i2.1075

Accepted: February 15th, 2024
Approved: April 04th, 2024

Author Affiliation:
Departement of Internal Medicine,
Medical Faculty and Health Science
Warmadewa University,
Sanjiwani Gianyar Hospital Bali,
Indonesia

Author Correspondence:
Ni Wayan Sri Wardani
Ciung Wanara-Gianyar Street No.2,
Gianyar, Bali 80511, Indonesia

E-mail:
wardanisri2016@gmail.com

Abstract

Background : Protein energy wasting (PEW) is one of several markers of the quality of hemodialysis (HD) services in Indonesia, however not many studies conducted PEW assessement with quality of life (QoL) domain of regular HD patients.
Aim: To determine comparison of PEW assessment with QoL domains in regular HD patients.
Methods : A Cross-sectional study with total sampling of 105 regular HD patients at Sanjiwani Gianyar General Hospital, on June to July 2022, The PEW assessments: body mass index (BMI), serum albumin, subjective global assessment (SGA), malnutrition inflammation score (MIS), and the International Society of Renal Nutrition and Malnutrition (ISRNM) with QoL domains by KDQOL-SF (Kidney Disease Quality of Life Short Form).
Results : Most of the subjects were men (54.2%), the mean age was51.66 years and mean duration of HD was 50.28 months. The mean of BMI, serum creatinine, and serum albumin were 23.46 kg/m^2, 9.70 mg/dL, and 3.86 mg/dL respectively, and median MIS 5. This study obtained significant correlation of BMI and QoL domains: work status, physical functioning, role of physics, energy/fatigue, and SF 12 physical composite. The MIS also significantly correlated with emotional well-being, sleep, and burden of disease. And ISRNM significantly correlated with energy/fatigue, and sexual function, On logistic regression analysis, this study obtained that albumin was significantly related to general health, emotional well-being, and energy/fatigue,
Conclusion: Assessment of PEW (BMI, serum albumin, MIS, SGA, and ISRNM) were related to several domains of QoL.

Keywords : Protein Energy Malnutrition, Hemodialysis, quality of life

INTRODUCTION

Patients undergoing hemodialysis (HD) have increased from year to year. In 2015, there were 2.9 million people who needed dialysis in Asia. It is estimated that the number is increasing by more than 10% per year.[1] Based on report of 2018th Indonesian Renal Registry, there are 132,142 people were actively undergoing regular hemodialysis, and the highest proportion was 61.5% at the age of 45–64 years (productive age group).[2] Regular HD patients often experience protein energy malnutrition or protein energy wasting (PEW) complications. Protein energy wasting is a condition of malnutrition and inflammation that occurs simultaneously and is caused by decreased nutritional intake, inflammatory processes, uremic toxins, catabolism processes related to dialysis, metabolic derangements, comorbid diseases, cardiovascular diseases, infections, frailty, and depression.[3] Several studies have been conducted found that the prevalence of PEW in regular HD patients varies between 28–69%.[4,5] This depends on the assessment of PEW diagnosis, such as the simplest PEW measurement BMI, serum albumin levels to the combined measurement of the MIS index, SGA and ISRNM criteria.[6]

Protein energy wasting occurs progressively with decreased kidney function and duration of HD, which will affect to weakness, frailty, decreased response to erythropoietin, and the QoL of regular HD patients.[7] However, there were lack of research in Indonesia that investigated the relationship between PEW and quality of life domain of regular HD patients. Study by Zuijdewijn *et al*. (2015) obtained a significant relationship between SGA, MIS, and the mental domain of quality of life in regular HD patients. The research in Bahrain Manama 2020 found that there was a relationship between the family domain and the psychological domain of the QoL of regular HD patients.[9] Are these various PEW assessments related to the quality of life of regular HD patients in Indonesia? There were not many studies carried out the relationship of PEW and QoL domain. Therefore, it is important to conduct this research to examine the relationship between various PEW assessments by BMI, serum albumin, serum creatinine, SGA, MIS, and ISRNM criteria and the QoL domain of regular HD patients. This study also important in the inflammation and malnutrition influence to the outcomes of regular HD patients and also in nutritional interventions of regular HD patients.

METHODS

This study was a cross-sectional study to determine the prevalence of PEW and its comparison of PEW assessment with QoL domains of regular HD patients at Hemodialysis Unit Sanjiwani Gianyar General Hospital on June to July 2022. Protein energy wasting was assessed by BMI, serum albumin, serum creatinine, SGA, MIS, and ISRNM criteria. The quality of life of regular HD patients was assessed by KDQOL-SF, and then analysed by software SPSS. Correlation of each PEW assessment with each QoL domain were analysed with Pearson correlation and also multivariate analysis by logistic regression. All of the subjects signed the informed consent.

RESULTS

This study was conducted in hemodialysis unit of Sanjiwani Gianyar General Hospital, and a total of 105 patients met the inclusion criteria. This study consisted of 58 (54.2%) men; the mean age was 51.66 years, and the mean length of HD was 50.28 months. All subjects underwent 9 hours HD a week. This study found that the mean of BMI, serum creatinine, and serum albumin were 23.46 kg/m^2, 9.70 mg/dL, and 3.86 mg/dL respectively, and the median MIS was 5. Fifty percent subjects were actively working as farmers, labourers, private workers, and civil servants or armies/police. The main causes of chronic kidney disease were Diabetes Mellitus and hypertension in 46.7% of subjects, followed by chronic glomerulonephritis in 20.6% and chronic pyelonephritis in 20.6% of subjects, as depicted in Table 1.

This study obtained prevalence of PEW based on BMI <18.5 kg/m^2, albumin <3.8 mg/dL, MIS >5, SGA B and C, and ISRNM ≥=2 were 7.6%, 40%, 47.6%, 41%, and 41%respectively. Body mass index is the simplest parameter in this study, but it is less capable of determining PEW in CKD patients with multifactorial aetiology. The biochemical parameter of serum albumin is almost the same as the SGA criteria and MIS composite criteria as well as the standard PEW criteria with ISRNM in detecting malnutrition. In our study assessment of quality of life in CKD patients using KDQOL-SF. The subject's quality of life consists of several domains as described in Table 2. This study found the mean of overall health and general health were 68.57 ± 20.96 and 59.18 ± 18.62 respectively, the cognitive status mean 71.49 ± 16.86 and quality of social interaction 77.90 ± 15.56, social support and dialysis staff encouragement were 85.71 ± 21.41 dan 90.60 ± 12.11. The effect of kidney disease were 69.72 ± 16.91, while the work status, emotional well-being, role of limitation-physical and low of energy/fatigue were 2.86 ± 32.64, 34.36 ± 16.98, 24.76 ± 34.41, dan 31.75 ± 40.66, as listed in Table 2.

This study examined the relationship between PEW and quality of life domain of regular HD patients. Base on Pearson correlation analysis, this study obtained that BMI was significantly correlated with work status with r= -0.356 at p = 0.018, physical functioning with r= 0.036 at p=0.015 and role of physic with r=0.327 at p=0.030.

TABLE 1
Baseline Characteristics

Variable		Percentage (%)	Mean±SD
Age			51.66 ± 12.15
Sex (♂ Man)		55.2	
Duration of HD (months)			50.8 ± 30.99
Etiology of CKD	Type 2 DM	21.5	
	Hypertension	26.2	
	CGN	20.6	
	CPN	20.6	
Serum creatinine			9.70 ± 2.85
Albumin			3.86 ± 0.38
BMI			23.46 ± 2.88
MIS	≤ 5	52.4	
	> 5	47.6	
SGA	A	59	
	B	38.1	
	C	2.9	
ISRNM	Mild malnutrition	40.0	
	Moderate malnutrition	32.4	
	Severe malnutrition	8.6	

HD = *hemodialysis;* CKD = *chronic kidney disease,* BMI = *Body mass index;* MIS = *malnutrition inflammation score,* SGA = *subjective global assessment,* ISRNM = *International society of renal nutrition and malnutrition,* CGN = *chronic glomerulonephritis,* CPN =*Chronic Pyelonephritis*

In this study, the PEW assessment was classified into good and poor quality of base on the median values of each domain. It was found that high albumin (>3.8 mg/dL) was significantly associated with good overall health (>70) with OR=2.6 (CI 95 = 1.19–5.95) at *p*= 0.026. High albumin was also significantly associated with good general health (> 60) with OR 2.46 (CI 95 = 1.08–5.58) with logistic regression analysis it was obtained that high albumin was significantly associated with good general health with ExpB = 2.464 (CI95 = 1.028–5.909) in *p*=0.43. High albumin is also associated with good emotional function with B = 2.451 (CI95= 1.044–6.187) at *p*=0.40, good social function with B = 3.034 (CI95=1.234–7.458) at *p*=0.16. and fatigue, with B = 2.419 (CI95= 1.002–5.836) at *p*=0.49. as in Table 4.

DISCUSSION

This study investigated the prevalence of PEW and its relationship with quality of life domain in regular HD patients. PEW assessment which included BMI, albumin, MIS, SGA and ISRNM criteria is associated with each quality of life domain is new in this study. This study found that the prevalence of PEW based on albumin <3.8 g/dL, MIS >5, SGA B and C, and ISRNM ≥2 were 7.6%, 40%, 47.6%, 41%, and 41% respectively. The prevalence of PEW in this study was found to be lower than several other studies which found that the prevalence of PEW in Southeast Asia was 52.8% by MIS or SGA.[4] While, BMI <18.5, is less sensitive to assess PEW, that It had multifactorial aetiology, however this study obtained the prevalence of PEW is lower than the study that conducted anthropometrically in Ethiopia (23.4%).[10] A study conducted in Malaysia by Harvinder *et al* in 2016 found a higher prevalence of PEW as assessed by ISRNM criteria was 59%, while the prevalence of PEW with an MIS value ≥5 higher was 88% in regular HD patients. In Harvinder's study, it was found that the HD duration of most patients was more than 5 years (68%)[11] whereas in our study the mean HD duration was 50 months (<5 years) which could influence inflammation in PEW. In our previous study found PEW by ISRNM criteria was

TABLE 2
The Quality of Life Domains of Subjects

Quality of Life Domains	Mean±SD
Overall health	68.57 ± 20.96
Symptom problem list	69.72 ± 16.91
Effect of Kidney Disease	67.65 ± 17.07
Burden of kidney Disease	42.14 ± 23.67
Work status	32.86 ± 32.64
Cognitive status	71.49 ± 16.86
Quality of Social interaction	77.90 ± 15.56
Sexual function	79.26 ± 27.00
Sleep	61.79 ± 16.25
Social Suport	85.71 ± 21.41
Dialisis staff encouragement	90.60 ± 12.11
Patient Satisfaction	70.32 ± 17.60
Physical functioning	58.71 ± 26.10
Role of limitation-physical	24.76 ± 34.41
Pain	69.05 ± 22.09
General health	59.18 ± 18.62
Emotional well-being	34.36 ± 16.98
Role limitation-emotional	31.75 ± 40.66
Social function	65.36 ± 20.60
Energy/ Fatigue	43.48 ± 17.50
SF 12 physical-composite	41.49 ± 8.79
SF 12 mental composite	35.13 ± 7.13

66.2% and 69% by MIS ≥5.[5] This study found a lower prevalence of PEW compared to previous studies because in the last 2 years we carried out a fluid and nutrition maintenance training program for caregivers of HD patients. All of the subjects in this study underwent intermittent HD for 9 hours a week and this study obtained better medians for several domains of subject quality of life than other studies. The mean of overall health, cognitive status, quality of Social interaction, sexual function, sleep and general health were 68.57 ± 20.96, 71.49 ± 16.86, 77.90 ± 15.56, 79,26 ± 27.00, and 61.79 ± 16.25, 59.18 ± 18.62 respectively. This study also analyzed each quality of life domain and found an overall health average of 68.57, better than reseach conducted at Sanglah General Hospital in 2020 of 62.17.[12] This study included subjects with a mean age similar to the study at Sanglah General Hospital, but the domains of social function (65.36 vs 62.71), physical function (65.36 vs 55.08) and sexual function (79.26 vs 26.25) were better in our study than in the Sanglah study. The characteristic difference in this study is that there were fewer male subjects (55%) compared to Sanglah General Hospital (66.6%). Our research was conducted in the district area, while Sanglah's research was conducted in the provincial capital, so further research is needed regarding the relationship between social factors and sexual relations with the quality of life of regular HD patients.[12]

Our study also analyzed between each PEW assessment and the QoL domain, we found that MIS was negatively significant correlated with emotional well-being, sleep and burden of disease. That meant lower MIS (≤5) was correlated with better emotional well-being, sleep and burden of disease rather than the patients with higher MIS (>5). In a study conducted by Bilqic *et al* in Ankara, Turkey, found that patients who had a high MIS >8 had greater sleep disturbances compared to those with

TABLE 3
Correlation of PEW with quality of life domains

PEW assessement	Quality of life domains	r	*p*
BMI	Work status	-0.356	0.018
	Physical functioning	-0.363	0.015
	Role of physic	-0.327	0.030
	Energy/fatique	-0.374	0.012
	SF 12 phisic composite	-0.428	0.004
Serum Albumin	No quality of life domains were significantly correlated		
MIS	Emotional well-being	-0.331	0.028
	Sleep	-0.311	0.040
	Burden of disease	-0.349	0.020
ISRNM	Energy /fatique	-0.349	0.020
	Sexual function	-0.383	0.010

TABLE 4
Logistic Regression Analysis of PEW with Quality of Life Domains

PEW Assessment/Quality of Life domain		ExpB	CI95%	*p*
BMI	Burden of disease	0.232	0.66-0.818	0.023
	Role of physics	0.208	0.059-0.731	0.014
	SF 12 Mental	0.141	0.035-0.573	0.006
Abumin	General health	2.464	1.028-5.909	0.043
	Emotional	2.541	1.044-6.187	0.040
	Role of emotional	3.034	1.234-7.458	0.016
	Fatigue	2.419	1.002-5.836	0.049
MIS		–	–	–
SGA		–	–	–
ISRNM		–	–	–
ISRNM	SF 12 Mental	0.211	0.048-0.918	0.038

an MIS <6.[13] Other study that conducted by Visiedo *et al* and Rambod *et al* found that patients who had PEW, also had lower emotional well-being, that is similar with our study.[14,15]

This study also investigated the relationship between PEW based on ISRNM criteria with energy/fatigue and sexual function as QoL domain. Our study found that SF 12 mental was significantly related to ISRNM criteria. That is similar with the previous studies by Viseido *et al*, that found a significant relationship between mental SF 12 and malnutrition with ISRNM criteria.[14] That meant our study supported that higher PEW score by ISRNM criteria was related to lower SF 12 mental score as QoL domain.

Meanwhile, this study obtained the anthropometry with BMI is significantly negatifve correlated with mean work status, physical functioning, energy/fatigue, and SF 12 physics. and also found significantly with burden of disease, role of physics and SF 12 mental. However the influence of BMI is not too

strong on the quality of life domain. Other studies have examined the relationship between BMI and quality of life, such as research by Apple R *et al*. which found that BMI was significantly related to physical and mental roles. That meant our study found that there were relationship between BMI in obese patients and lower physical functioning scores.[16,17]

CONCLUSION

The prevalence of PEW in this study was lower than other similar studies. BMI is significantly correlated to Burden of disease, role of physics and SF 12 mental, Albumin is significantly correlated to general health, emotional, role of emotional and fatigue. MIS also significantly correlated to emotional well-being, sleep and burden of disease. Criteria of ISRNM were significantly correlated to fatigue and sexual function. However this study did not found significant correlation of SGA and QoL domains. We should continue this study by case control study of PEW assessment the QoL of HD patients.

Acknowledgement
My gratitude to of all of staff hemodialysis unit at Sanjiwani Gianyar hospital, Warmadewa University and Health Science for supporting this research.

REFERENCES

1. Prasad N, Jha V. Hemodialysis in Asia. Kidney Dis. 2015;1(3):165–77.
2. PERNEFRI. 11th Report Of Indonesian Renal Registry 2018. Irr [Internet]. 2018;1–46. Available from: https://www.indonesianrenalregistry.org/data/IRR 2018.pdf
3. Carrero JJ, Stenvinkel P, Cuppari L, Ikizler TA, Kalantar-Zadeh K, Kaysen G, *et al*. Etiology of the Protein-Energy Wasting Syndrome in Chronic Kidney Disease: A Consensus Statement From the International Society of Renal Nutrition and Metabolism (ISRNM). J Ren Nutr. 2013;23(2):77–90.
4. Carrero JJ, Thomas F, Nagy K, Arogundade F, Avesani CM, Chan M, *et al*. Global Prevalence of Protein-Energy Wasting in Kidney Disease: A Meta-analysis of Contemporary Observational Studies From the International Society of Renal Nutrition and Metabolism. J Ren Nutr. 2018;28(6):380–92.
5. Wardani NWS, Budiyasa DGA, Sudhana IW, Widiana IGR. Nutritional status using ISRNM criteria and MIS of chronic haemodialysis patients at Sanjiwani Gianyar General Hospital. J Phys Conf Ser. 2019;1157(4).
6. M R, T I. Nutrition. In: JT D, PG B, Ing TS, editors. Hand Book of Dialysis. Fifth. Philadelphia: Wolters Kluwer Health; 2015. p. 535–54.
7. Hanna RM, Ghobry L, Wassef O, Rhee CM, Kalantar-Zadeh K. A Practical Approach to Nutrition, Protein-Energy Wasting, Sarcopenia, and Cachexia in Patients with Chronic Kidney Disease. Blood Purif. 2020;49(12):202–11.
8. Zuijdewijn CLM de R van, Bots MPCGML, Blankestijn PJ, Dorpel MA van den, Menso J. Nubé PM ter W. comparing multi assesment of PEW and QOL. 2015.
9. El-Habashi AF, El-Agroudy AE, Jaradat A, Alnasser ZH, Almajrafi H, R H. Alharbi, Asma Alanzy2 AMA. Quality of Life and its Determinants among Hemodialysis Patients: A Single-Center Study. Saudi J Kidney Dis Transpl. 2020;31(2):460–72.
10. Merga C, Girma M, Teshome MS. Protein-energy wasting and associated factors among chronic kidney disease patients at st. Paul's hospital millennium medical college, addis ababa, ethiopia. Int J Nephrol Renovasc Dis. 2020;13:307–18.
11. Harvinder GS, Swee WCS, Karupaiah T, Sahathevan S, Chinna K, Ahmad G, *et al*. Dialysis malnutrition and malnutrition inflammation scores: Screening tools for prediction of dialysis - related protein-energy wasting in Malaysia. Asia Pac J Clin Nutr. 2016;25(1):26–33.
12. Wardani NWS, Widiana IGR, Kandarini Y. Role of malnutrition inflammation score and interleukin-6 on quality of life of regular hemodialysis patients. Bali Med J. 2022;11(1):545–50.
13. Bilgic A, Akgul A, Sezer S, Arat Z, Ozdemir FN, Haberal M. Nutritional Status and Depression, Sleep Disorder, and Quality of Life in Hemodialysis Patients. J Ren Nutr. 2007;17(6):381–8.
14. Visiedo L, Rey L, Rivas F, López F, Tortajada B, Giménez R, *et al*. The impact of nutritional status on health-related quality of life in hemodialysis patients. Sci Rep [Internet]. 2022;12(1):1–8. Available from: https://doi.org/10.1038/s41598-022-07055-0
15. Nurulain T. Zaveri. Neonatal Mouse Heart Extract. HHS Public Access. Physiology & Behavior [Internet]. 2016;176(10):139–48.
16. Apple R, Samuels LR, Fonnesbeck C, Schlundt D, Mulvaney S, Hargreaves M, *et al*. Body mass index and health-related quality of life. Obes Sci Pract. 2018;4(5):417–26.
17. Cabezas-Rodriguez I, Carrero JJ, Zoccali C, Qureshi AR, Ketteler M, Floege J, *et al*. Influence of body mass index on the association of weight changes with mortality in hemodialysis patients. Clin J Am Soc Nephrol. 2013;8(10):1725–33.