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Subjective Global Assessment for Nutritional Assessment of Patients on Regular Hemodialysis at Dialysis Unit at Tanta University Hospital

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Abstract

Background: Malnutrition is a major negative prognostic factor in dialysis patients. Simple and reliable estimations of nutritional status may therefore prove of particular value in the follow-up of these patients.

Aim of Study: To assess the nutritional status of hemodialysis patients using the Subjective Global Assessment (SGA) method and to validate Subjective Global Assessment (SGA) we compared subjective global assessment with objective measurements (anthropometry, biochemical measurements).

Patients and Methods: 100 patients aged from (18-65) on regular hemodialysis at Hemodialysis Unit of Tanta University Hospitals. All were subjected to history taking, physical and clinical examination, routine laboratory investigation and we used the parameters of Subjective Global Assessment (SGA) for evaluating nutritional status of hemodialyzed patients with anthropometric measurements and laboratory parameters.

Results: 100 patient were assessed and about 82 patient were categorized as Group A which represent well-nourished groups and 18 patient were categorized as Group B which represent malnourished groups, there was statistically significant difference as regard to BMI, BMR, Hb, TLC, s.iron, Creat, CRP, albumin, Ca, Na, lipid profile and nutritional status. And there was significant correlation between BMI and albumin, CRP, Hb, cholesterol, TG, and LDL and also there was significant correlation between BMR and CRP, cholesterol, TG, LDL and HDL. And according to multi regression analysis the independent predictors for nutritional assessment in hemodialysis patients were albumin, creatinine and hemoglobin.

Conclusion: SGA is an easy-to-use as nutritional assessment tool that allows quick identification of malnutrition in hemodialysis patients.

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Key Words: *Chronic Kidney Disease (CKD) – Nutrition – Subjective Global Assessment (SGA).*

Introduction

POOR nutritional status is a well-documented consequence of CKD. It is an important prognostic predictor for patients starting dialysis. In fact, the uraemic malnutrition is recognised to be the strongest risk factor for adverse outcomes and death in patients suffering from CKD. Further, Protein Energy Malnutrition (PEM) is also commonly observed in CKD patient undergoing hemodialysis and has been associated with increased morbidity and mortality among these patients **[1]**.

The cause of malnutrition is multifactorial and includes: Inadequate food intake, hormonal and gastrointestinal disorders, dietary restrictions, drugs that alter nutrient absorption, insufficient dialysis, and constant presence of associated diseases. Furthermore, uremia, acidosis, and HD procedure are hypercatabolic and associated with the presence of an inflammatory state **[2]**.

Nutritional status is frequently ignored in many dialysis centers while simple methods of nutritional assessment could have a favorable impact on patient management **[3]**.

Among various nutritional assessment tools for CKD, the National Kidney Foundation's Kidney Disease Outcome and Quality Initiative (KDOQI) recommended the Subjective Global Assessment (SGA) as the established clinical nutrition assessment tool to be of prognostic value for CKD patients **[4]**.

Subjective global assessment is a well-established tool to assess nutritional status and a feasible method to ascertain Protein Energy Wasting (PEW) based on a patient's medical history and physical examination. Moreover, it can be applied quickly in clinics without technical difficulties [5].

Subjects and Methods

The study was carried out on:

100 patient aged from (18-65) on Regular Hemodialysis at Hemodialysis Unit at Tanta University Hospital.

This study was carried out from between Octobar 2016 and March 2017.

An informed consents was taken from all participants and the privacy of the data will be greatly considered.

Study design:

It is cross sectional observational study.

Inclusion criteria:

Patients who are on regular hemodialysis due to chronic renal failure.

Exclusion criteria:

1- Patients suffer from infectious disease.

2- Patients suffer from chronic inflammatory disease.

3- Patients suffer from liver disease or malignancy.

4- Pregnant women.

All patients included in the study were subjected to:

- Through history taking including (weight change in last 6 month and past 2ws, dietary intake, gastrointestinal symptoms and functional capacity).
- Physical examination including: (Subcutaneous fat, muscle wasting, oedema related to malnutrition and ascites related to malnutrition).

Anthropometric measures including:

Body Mass Index (BMI), dry weight, height and Basal Metabolic Rate (BMR) by Harris Benedict method, and for the purpose of our study we used the online calculator based on hight, age, weight and gender.

Laboratory investigations including:

1- Serum albumin.

2- Complete blood picture.

3- Blood urea and serum creatinine.

4- C-Reactive Protien (CRP).

5- Lipid profile (cholesterol-triglycerides-LDL-HDL).

6- Minrals (Ca, P, Na, K, serum iron).

7- Parathyroid Hormone (PTH).

Using this parameters of Subjective Global Assessment (SGA) [6] for evaluating nutritional status of hemodialyzed patients.

Statistical analysis of the data:

Statistical presentation and analysis of the present study was conducted, using the mean, standard deviation and chi-square test by SPSS V.20.

The subject of regression analysis: Deals with the statistical analysis of the data collected on more than one (response) variable. These variables may be correlated with each other, and their statistical dependence is often taken into account when analyzing such data. Infact, this consideration of statistical dependence makes multivariate analysis somewhat different in approach and considerably more complex than the corresponding univariate analysis, when there is only one response variable under consideration.

Results

This is across-sectional observational study conducted on 100 patient aged from (18-65) on regular hemodialysis who were divided by using subjective global assessment for nutritional assessment mal in to two groups Group A and Group B.

- Group A which were well nourished.
- Group B which were moderate malnourished and represent malnourished group in our study.
- Group A 82 patient, 44 male and 38 female aged from (20-65). The mean age was 50.09 ± 13.69.
- Group B 18 patient, 12 male and 6 female aged from (18-65). The mean age was 46 ± 16.97.

Comparison between Group A and Group B as regard to weight, height, body mass index and basal metabolic rate, there was statistically signif-

icant difference as regard to weight, basal metabolic rate and body mass index as they increased in Group A more than Group B but there was no statistically significant difference as regard to height, as shown in (Table 1).

Comparison between Group A and Group B as regard to Hb, total leucocyte count, platelets, serum iron, urea, creatinine, CRP, albumin, cholesterol, HDL, LDL, triglycerides,serum calcium, phosphate, potassium, sodium and para thyroid hormone. There was statistically significant difference between two groups as regard to Hb, total leucocyte count, serum iron, creatinine, CRP, albumin, cholesterol, HDL, LDL, triglycerides, calcium, sodium but there was no statistically significant difference as regard to platelets, urea, phosphate, potassium, and PTH. As shown in (Table 2).

In this study there was statistically significant positive correlation between body mass index and albumin, Hb, cholesterol, TG and LDL but there was statistically significant negative correlation between body mass index and CRP. As shown in (Table 3).

In this study there was statistically significant positive correlation between basal metabolic rate and cholesterol, TG and LDL, but there was statistically significant negative correlation between basal metabolic rate and CRP, HDL. As shown in (Table 4).

Using stepwise multi regression analysis the independent predictors for nutritional assessment in hemodialysis patients were albumin, Hb and creatinine. As shown in (Table 5).

Table (1): Comparison between Group A and Group B as regard to weight, height, body mass index and basal metabolic rate.

	Range	Mean ± S.D	*t*.test	*p*-value
Weight:				
Group A	50-101	74.12± 13.09	35.256	0.001*
Group B	39-69	53.72±9.98		
Height:				
Group A	148-187	162.54±8.37	0.465	0.497
Group B	142-180	164.17± 12.34		
BMI:				
Group A	20.5-52.6	28.42±5.84	3 9.644	0.001*
Group B	17.7-22.5	19.67± 1.23		
BMR:				
Group A	1204-6478	1821.96± 1061.85	5.028	0.026*
Group B	1138-1418	1255.17±78.87		

Table (2): Comparison between Group A and Group B as regard to Hb, TLC, platlate, s.iron, urea, creatinine, CRP, albumin, cholesterol, triglycerides, LDL, HDL, Calcium, phosphate, Na, K and Parathyroid hormone.

	Range	Mean ± S.D	*t*.test	*p*-value
Hb:				
Group A	9-14.9	10.85± 1.46	52.587	0.001*
Group B	7-9	8.33±0.69		
TLC:				
Group A	2030-11100	6606.23±2449.80	56.085	0.001*
Group B	6870-13520	11177.39± 1633.17		
PLT:				
Group A	16000-450000	203810.98 ±91090.06	0.107	0.744
Group B	76000-361000	196166.67 ±83454.28		
S. Iron:				
Group A	0.8-2.5	1.25±0.43	70.952	0.001*
Group B	0.1-0.7	0.37±0.22		
Urea:				
Group A	46-176	107.27±30.44	0.306	0.582
Group B	56-164	102.89±30.43		
Creat:				
Group A	4-11.9	7.80± 1.87	26.721	0.001*
Group B	3-6.6	5.47±0.80		
CRP:				
Group A	3-6	4.39±0.62	317.094	0.001*
Group B	6-9	7.33±0.69		
Albumin:				
Group A	3.4-4.9	3.70±0.26	103.267	0.001*
Group B	2.5-3.3	3.03±0.22		
Cholesterol:				
Group A	150-300	175.34±26.34	25.172	0.001*
Group B	134-149	144.00±3.83		
TG:				
Group A	50-193	133.88±36.26	31.270	0.001*
Group B	60-100	85.50± 10.12		
LDL:				
Group A	44-162	103.65±33.43	7.339	0.008*
Group B	66-110	82.00± 10.38		
HDL:				
Group A	34-58	42.82±4.34	5.049	0.027*
Group B	39-42	40.50±0.79		
Calcium:				
Group A	1.1-2.8	2.18±0.34	13.111	0.001*
Group B	1.1-2.0	1.56±0.27		
Phosphat:				
Group A	2.2-5.8	4.26±0.81	1.673	0.199
Group B	2.8-5.6	3.99±0.83		
Na:				
Group A	132-148	139.47±3.65	56.179	0.001*
Group B	107-135	131.05±6.61		
K:				
Group A	3.5-6	5.13±0.56	1.276	0.261
Group B	3.5-6.4	4.95±0.75		
PTH:				
Group A	30.6-929	246.15± 187.32	0.498	0.482
Group B	23.1-911	209.80±241.57		

Table (3): Correlation between body mass index and other laboratory paramerters (albumin, CRP, Hb, creatinine, cholesterol, triglycerides, LDL, HDL) in the studied cases.

	BMI	
	r	*p*
Albumin	0.267	0.007*
CRP	–0.46	0.00 1*
Hb	0.331	0.00 1 *
Creat.	0.123	0.221
Cholesterol	0.635	0.00 1 *
TG	0.612	0.00 1 *
LDL	0.582	0.00 1*
HDL	–0.128	0.205

Table (4): Correlation between basal metabolic rate and other laboratory paramerters (albumin, CRP, Hb, creatinine, cholesterol, triglycerides, LDL, HDL) in the studied cases.

	BMR	
	r	*p*
Albumin	0.110	0.274
CRP	–0.236	0.018*
Hb	0.151	0.133
Creat.	0.131	0.198
Cholesterol	0.303	0.002*
TG	0.341	0.00 1*
LDL	0.281	0.005*
HDL	–0.217	0.030*

Table (5): Multi regression analysis for predictors of nutritional assessment.

	B	S.E.	Wald	OR	95.0% C.I. for odd		*p*-value
					Lower	Upper	
Albumin	–0.194	0.059	10.775	0.824	0.734	0.925	0.001*
Creat	0.316	0.783	0.162	0.519	0.149	0.989	0.034*
CRP	0.343	0.63 8	0.288	1.371	0.295	6.362	0.687
Cholesterol	–0.753	1.175	0.410	1.409	0.403	4.924	0.591
TG	1.875	0.886	4.480	0.471	0.047	4.716	0.522
LDL	0.659	0.490	1.809	1.934	0.740	5.055	0.290
HDL	0.704	0.950	0.549	2.023	0.314	13.029	0.497
HB	–1.813	0.599	9.167	0.163	0.050	0.528	0.002*

Discussion

Malnutrition is an important risk factor in patients with chronic kidney disease and in those undergoing maintenance dialysis. Subjective global assessment is a reliable method to evaluate malnutrition in these patients [7].

In our study there was no statistically significant differences between the two groups regarding age and sex.

In our study there was statistically significant difference between two groups as regard to weight with *p*-value 0.001 and body mass index with *p*-value 0.001, both decreased in Group B more than Group A.

In agreement with our results Tan et al., [4]. Their study showed that there was statistically significant difference regarding BMI, weight and SGA status, as both decreased in malnourished patients more than normal patients.

In agreement with our results Sedhain et al., [8] who found that there was no statistically significant difference as regard to height between normal and malnourished patients.

In our results there was statistically significant difference as regard to basal metabolic rate as basal metabolic rate decreased in Group B more than Group A with *p*-value 0.026. In agreement with our results Sahathevan et al., [9] but disagree with our results Sahin et al., [10].

In our results there was no statistically significant difference regarding to kt/v. In agreement with our study Yang et al., [11] but disagree with this result Kadiri et al., [12].

In our study there was statistically significant difference between two groups as regard to Hb as it decreased in Group B more than Group A with *p*-value 0.001. Hb decreased in both groups but more in malnourished patients (Group B). In agreement also with our results Sahin et al., [10]. But disagree with our results Espahbodi et al., [13].

In our results there was statistically significant difference as regard to blood leucocytes with *p*-value 0.001 as it increased in Group B more than Group A. In agreement with our results (Stolic et al., 2010) [14] but disagree with our results Sahin et al., [10].

In our results there was no statistically significant difference as regard to platelets between two groups. In agreement with our results Sedhain et al., [8].

In our results there was statistically significant difference as regard to serum iron with *p*-value 0.001 as it decreased in Group B more than Group A. In agreement with our results Rani et al., [15].

In this study there was statistically significant difference between two groups regarding to serum albumin with *p*-value (0.001) as serum albumin decreased in Group B more than Group A.

Also there was statistically significant difference between two groups regarding to c-reactive protein with *p*-value 0.001, it increased in Group B more

than Group A. In agreement with our results Sahin et al., **[10]**.

In our study there was significant difference between two groups regarding to serum creatinine with p-value 0.001, as serum creatinine decrease in Group B more than Group A. In agreement with our results (Yildiz et al., 2015) **[16]**. But disagree with our results Espahbodi et al., **[13]**.

In our results there was no statistically significant difference as regard to blood urea. In agreement with our result (Espahbodi et al., 2014) **[13]**. But in disagree with our results Sahathevan et al., **[9]**.

In our study there was statically significant difference between two groups regarding to lipid profile (cholesterol, LDL, HDL, TG).

As there was statistically significant difference regarding to serum cholesterol, with p-value 0.001, regarding to Low Density Lipoprotein (LDL) with p-value 0.008, regarding to triglycerides with p-value 0.001. And regarding to high density lipoprotein with p-value 0.027. As they all decreased in Group B more than Group A, in agreement with this results Gueguim et al., **[17]** who found that there was statistically significant difference as regard to cholesterol, LDL, HDL as they decreased in hemodialysis patients due to malnutrition but disagree with our results as there was no statistically significance difference as regard to triglycerides.

Dis agree also with our results Espahbodi et al., **[13]** who found that there was no statistically significant difference as regard to blood cholesterol between healthy and malnourished patients.

In this study there was statically significant difference between two groups as regard to serum sodium (Na) with p-value 0.001 as it decreased in Group B more than Group A. In agreement with our results Dekker **[18]**.

In our results there was no statistically significant difference as regard to serum potassium between two groups.

In our study there was significant difference between two groups regarding serum calcium with p-value 0.001 as it decrease in Group B more than Group A.

In our study there was no statistically significant difference between two groups regarding serum phosphate.

In our results there was no statistically significant difference as regard to PTH between two groups.

In our study there was significant negative correlation between body mass index and CRP with p-value 0.001. In agreement with this results Stenvinkel et al., **[19]**. But dis agree with our results Leal et al., **[20]**.

In this study there was significant positive correlation between body mass index and albumin with p-value 0.007. In agreement with our results Feingold et al., **[21]**.

In our study there was significant positive correlation between body mass index and hemoglobin with p-value 0.001. In agreement with our results Segall et al., **[22]**.

In our study there was significant positive correlation between body mass index and cholesterol, triglycerides and LDL with p-value 0.001. In agreement with our study Kilpatrick, et al., **[23]**.

In our study there was significant negative correlation between basal metabolic rate and CRP with p-value 0.018. In agreement with our results Bovio et al., **[24]**.

In our results there was significant positive correlation between basal metabolic rate and cholesterol with p-value 0.002, triglycerides with p-value 0.001, LDL with p-value 0.005 and HDL with p-value 0.030.

In this study according to stepwise multi regression analysis showed that the most independent predictors for nutritional assessment in hemodialysis patients are serum albumin with p-value 0.001, hemoglobin with p-value 0.002 and creatinine with p-value 0.034.

In agreement with this results (Kalantar et al., **[25]**, they found that there was significant relation between malnutrition and serum albumin as serum albumin was predictor of malnutrition, in agreement also with our results Veiga et al., **[26]**, their study showed that the independent predictor of malnutrition was hemoglobin.

In disagree with our results Chen et al., **[27]** their study showed that the levels of CRP also was a significant independent predictor of malnutrition.

Conclusion:

- Malnutrition in this group of patients are multifactorial and may have developed during the course of chronic kidney disease before reaching

the end stage as a result of anorexia, nausea and vomiting due to uremic toxicity, reduced nutrient intake due to dietary restriction without close monitoring by health care doctor or clinical condition such as inflammation.

- It is important to incorporate SGA in the care of hemodialysis patients for early detection of malnutrition and for medical nutrition therapy to optimize patients' nutritional status for better outcomes.

Recommendations:

- The small sample size from a single center may limit the power of the study. Hence, a large prospective multi-center study would help overcome this generalization of our study finding for the nutritional.
- SGA is a subjective assessment with its accuracy depending on the observer's experience. Therefore, the SGA should performed by a well-trained dietician to minimize the observer bias and it is important to include the dietician's assessment and individualized nutrition intervention as part of the overall treatment for hemodialysis patients to improve their outcomes.

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التقييم العالمى الموضوعى (إس-جى-آى) لتقييم الحالة الغذائية للمرضى الذين يقومون بعمل غسيل دموى منتتظم بوحدة الغسيل الكلوى بمستشفى جامعة طنطا

تم تقسيم مرضى الغسيل الكلوى بواسطة (الإس-جى- آى) إلى مجموعتين:

- المجموعة (أ) وكانت تمثل المرضى التى كانت بحاجة غذائية جيدة وعددهم ٨٢ مريض.
- المجموعة (ب) وكانت تمثل المرضى التى تعانى من سوء تغذية وعددهم ١٨ مريض.

من تقييم نتائج هذه الرسالة ومقارنتها بنتائج الباحثين الآخرين فى نفس المجال يمكن التوصل إلى إمكانية إستخدام التقييم العالمى الموضوعى (الإس-جى-آى) لتقييم الحالة الغذائية لمرضى الغسيل الكلوى.