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Original Article

Prevalence of Malnutrition in Hemodialysis Patients: A Single-Center Study in Palestine

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ABSTRACT. Only a few studies have been published on the nutritional status of hemodialysis (HD) patients in Arab countries. The aim of this study was to determine the nutritional status and prevalence of malnutrition and its predictors among HD patients at An-Najah National University Hospital, Nablus, Palestine. A cross-sectional study was carried out on HD patients in this hospital. Seven-Point Subjective Global Assessment (7-point SGA) was used to assess the nutritional state of HD patients. Biochemical tests were obtained during the study period from medical files of the studied patients. A total of 106 HD patients were recruited for this study and assessed for nutritional status. More than half (60, 56.6%) of the recruited patients were males. The majority of the patients (86.8%) were above 45 years of age. Hypertension (65, 61.3%) was the most common comorbid conditions followed by diabetes mellitus (51, 48.1%). The median SGA score was 5.57 (5–6). More than half of the HD patients (56; 52.8%) were well-nourished while the remaining (50, 47.2%) had mild-to-moderate malnourishment. Univariate analysis indicated that SGA score was significantly higher in HD patients with college education (P = 0.026), nondiabetic (P = 0.044), nonhypertensive (P = 0.037), and those with current occupation (P = 0.025). No significant correlation was found between SGA score and potassium level (P = 0.134), calcium level (P = 0.883), albumin (P = 0.282), and phosphate level (P = 0.419). However, significant positive correlation was found between SGA core and hemoglobin level (P = 0.019; r = 0.227). Multivariate analysis showed no significant predictors of SGA score. In this pilot single-center study, malnutrition was detected in almost half of HD patients using SGA scale. Development of nutritional assessment protocols for HD is an important issue and needs to be followed up by health-care teams in HD centers.

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Introduction

Chronic kidney disease is a global public health challenge since patients with end-stage renal disease (ESRD) have to live on hemodialysis (HD) for the rest of their lives unless a kidney donor and a successful kidney transplantation is carried out.[1-4] Patients on HD

have increased mortality compared with the general population.[5-7] Several factors can play a negative role and increase risk of mortality among HD patients, particularly cardiovascular diseases.[8,9] An important noncardiovascular risk factor of mortality among HD patients is malnutrition.[10-16] Malnutrition in HD patients is due to restrictive food recommendations, poor appetite, and drug-related factors.[17,18] A study had shown that significant differences in nutritional and health outcomes do exists among different races which necessitates studies in various countries with respect to nutritional state of HD patients and variables affecting such state.[19] Studies on malnutrition in HD patients have been carried out in several countries in the Middle East, but none has been published about the nutritional status of HD patients in Palestine.[20,21] The health system in Palestine offers free medical services for patients with ESRD including HD, laboratory investigations, and medications. However, the quality of life of patients with ESRD requires periodic assessment of nutritional status to avoid protein wasting and avoid negative health consequences of malnutrition. To achieve this, dietitians are required to assess the nutritional status of HD patients using a globally accepted scale. The Subjective Global Assessment (SGA) is one of the methods suggested to assess nutritional status in HD patients. The SGA was suggested by the National Kidney Foundation and has undergone several modifications since 1993.[22-26]

Based on all of the above reasons, we carried out this study to assess nutritional status and prevalence of protein–energy malnutrition in HD patients in a referral HD center in North Palestine, Nablus. This center in An-Najah National University Hospital (NNUH), Nablus, Palestine, is a recently built center to provide services for HD patients in Nablus district. The center is well equipped, and well-trained staff of physicians, nurses, and clinical pharmacists run the center. This study will be the first of its type in Palestine and therefore will help in introducing interventional methods to achieve an optimal nutritional status in HD patients.

Materials and Methods

This study was conducted to assess the nutritional status in patients who had ESRD and undergo HD at NNUH dialysis center in Nablus, Palestine. The Institutional Review Board of An-Najah National University along with NNUH approved the study. The principal investigators were trained on how to evaluate HD patients with the Seven-Point SGA (7-point SGA) by the hospital nutritional specialist.

Subjects

A total of 220 patients undergoing HD at An-Najah National University were asked to participate in the study; 109 agreed to participate and gave consent. Three of the studied patients died during the study, and therefore, a total of 106 patients were involved in this study and were followed up for nutritional state. The inclusion criteria were as follows: patient age ≥18 years, a minimum duration of dialysis of >3 months, and no history of renal transplant. Exclusion criteria were the presence of malignancy and presence of acute morbidity such as infection, elevated body temperature, wounds, and respiratory and gastrointestinal problems (to avoid the misleading influence of their condition on their nutritional status).

Assessment instruments and measures

In this study, the 7-point SGA was used. The total score of SGA for each patient was subjectively calculated and entered into the statistical program, the Statistical Package for the Social Sciences (SPSS) version 20.0 for Windows (SPSS Inc., Chicago, IL, USA). A total score of 6 or 7 indicated very mild risk of malnutrition to well-nourished malnutrition; a 3, 4, or 5 score indicates mild-to-moderate malnutrition; and 1 or 2 score revealed severe malnutrition. Biochemical measurements: serum albumin, potassium, phosphorus, calcium, parathyroid hormone, and blood hemoglobin were obtained from medical files, and only those tests carried during the study period (October–

November 2016) were obtained. Albumin values were categorized into either optimal (≥4 g/dL) or suboptimal (<4 g/dL).

Results

Out of 220 HD patients at An-Najah National University HD center, 106 gave consent to participate. More than half (60, 56.6%) of HD patients were males, and the majority (86.8%) were above 45 years of age. Furthermore, the majority were married (74, 69.4%) and had less than high school education (84, 79.2%). Regarding duration of illness, more than one-third (37, 34.9%) had ESRD for more than five years. Comorbid conditions in the study patients were mainly hypertension (HTN) (65, 61.3%) followed by diabetes mellitus (DM) (51, 48.1%). A total of 46 (43.4%) of the patients had both DM and HTN. Overall, 73.6% of HD patients had at least one comorbid condition. The majority (73.6%) of studied HD patients reported that they have been educated about the appropriate diet and approximately 70% of the studied patients reported having moderate-to-strong adherence to dietary restrictions. Demographic and clinical information of the studied patients are presented in Table 1.

The median (Q1–Q3) of SGA score was 5.57 (5–6). Figure 1 is a boxplot presentation of the SGA score while Table 2 shows details about SGA score distribution. The nutritional status of the patients indicated that 56 (52.8%) were well-nourished while the remaining (50, 47.2%) had mild-to-moderate malnutrition (Table 3).

The SGA score was analyzed for association with various demographic and clinical variables (Table 4). Mann–Whitney U-test showed no significant difference in SGA score based on gender (P = 0.303), age (P = 0.054), duration of illness (P = 0.798), and marital status (P = 0.791). However, SGA scores showed a significant difference in HD patients based on educational level (P = 0.025). Patients with ≤ high school education had significantly lower mean rank scores than those with college education. Further analysis of SGA score showed that patients with DM had significantly lower SGA score (P = 0.044) than nondiabetic patients. Similarly, patients with HTN had significantly lower SGA score (P = 0.037) than non-HTN patients. Patients with comorbid condition had significantly (P = 0.012) lower SGA scores than those with no comorbid conditions.

Correlational analysis was carried out between SGA scores and laboratory results using Spearman correlation (Table 5). No significant correlation was found between SGA score and

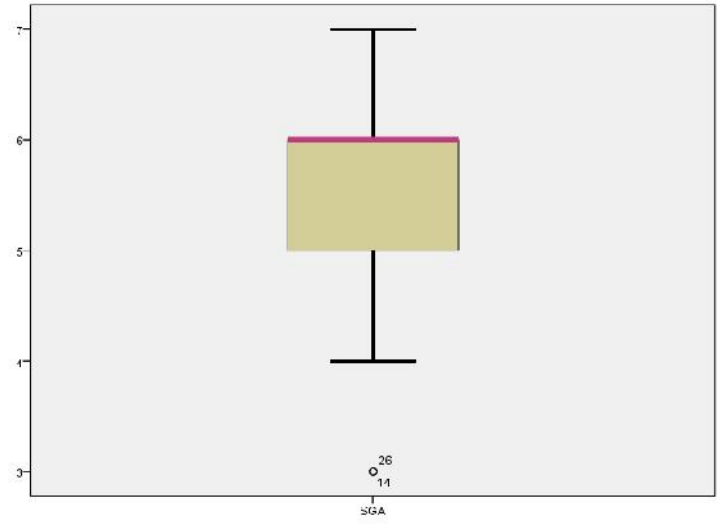

Figure 1. Boxplot presentation of SGA scores in studied hemodialysis patients.
SGA: Subjective Global Assessment.

Table 1. Demographic and clinical variables of studied hemodialysis patients

Variable	Statistics
Gender	
Male	60 (56.6%)
Female	46 (43.4%)
Age	
<45	14 (13.2%)
45–54	23 (21.7%)
55–64	44 (41.5%)
≥65	25 (23.6%)
Marital status	
Married	74 (69.8%)
Single/widowed/divorced	32 (30.2%)
Education	
≤ high school	84 (79.2%)
≥ college	22 (20.8%)
Duration of illness	
<5	69 (65.1%)
≥5	37 (34.9%)
Diabetes mellitus	
Yes	51 (48.1%)
No	55 (51.9%)
Hypertension	
Yes	65 (61.3%)
No	41 (38.7%)
Presence of comorbid diseases	
Yes	78 (73.6%)
No	28 (26.8%)
Residence	
City	40 (37.7%)
Suburbs	66 (62.3%)
Income	
<400 USD	57 (53.2%)
≥400 USD	54 (42.5%)
Diet was prescribed by dietitian	
Yes	78 (73.6%)
No	28 (26.4%)
Compliance to diet restriction	
Strong	26 (24.5%)
Moderate	48 (45.3%)
Poor	32 (30.2%)
Family size	
<3	27 (25.5%)
3–5	38 (35.8%)
>5	41 (38.7%)
Occupation	
Yes	12 (11.3%)
No	93 (87.7%)
House owned	
Yes	93 (87.7%)
No (rent)	13 (12.3%)

Table 2. Distribution of SGA scores.

Score	SGA
3	2 (1.9%)
4	7 (6.6%)
5	41 (38.7%)
6	43 (40.6%)
7	13 (12.3%)

SGA: Subjective Global Assessment.

Table 3. Prevalence of malnourishment among studied patients at baseline and after 2 months.

Nutritional status	SGA
Well nourished	46 (52.9%)
Mild-to-moderate malnutrition	60 (47.1%)
Severe malnourishment	0

SGA: Subjective Global Assessment.

Table 4. Univariate analysis for association of demographic and clinical variables with SGA scores.

Variable	Mann–Whitney U or Kruskal–Wallis H-test	
	Mean ranks	*P*
Gender		0.303
Male	56.02	
Female	50.22	
Age		0.054
<45	71.29	
45–54	54.52	
55–64	52.08	
≥65	45.10	
Marital status		0.791
Married	54.63	
Single/widowed/divorced	53.01	
Education		0.026
≤high school	50.33	
≥college	65.61	
Duration of illness		0.798
<5	54.02	
≥5	52.53	
Diabetes mellitus		0.044
Yes	47.67	
No	58.91	
Hypertension		0.037
Yes	48.88	
No	60.83	
Presence of comorbid diseases		0.012
Yes	49.32	
No	65.14	
Presence of comorbid diseases		0.012
Yes	49.32	
No	65.14	
Residence		0.109
City	59.24	
Suburbs	50.02	

Continuation of Table 4.

Variable	Mann–Whitney U or Kruskal–Wallis H-test	
	Mean ranks	*P*
Income		0.343
<400 USD	49.20	
≥400 USD	54.41	
Diet was prescribed by dietitian		0.535
Yes	54.54	
No	50.61	
Compliance to diet restriction		0.89
Strong	51.42	
Moderate	55.33	
Poor	52.44	
Family size		0.582
<3	52.96	
3–5	50.20	
>5	56.91	
Occupation		0.025
Yes	70.29	
No	50.77	
House owned		0.711
Yes	53.89	
No (rent)	50.73	

SGA: Subjective Global Assessment.

potassium level (P = 0.134), calcium level (P = 0.883), albumin (P = 0.282), and phosphate level (P = 0.419). However, significant positive correlation was found between SGA core and hemoglobin level (P = 0.019; r = 0.227).

Multivariate analysis in which the SGA score was used as a dependent factor and variables which showed significance in univariate analysis were used as independent categorical variables showed that there were significant predictors of SGA score. Multivariate analysis is shown in Table 6.

Discussion

In this study, we aimed to estimate the nutritional status of a sample of HD patients and potential significant predictors of nutritional status among the studied patients. Our study indicated that 47.1% of the studied patients had mild-to-moderate malnutrition. Although the nutritional score was significantly associated with certain demographic and clinical variables, no variables were found to be a significant predictor of nutritional status among the studied patients. Several studies on nutritional state in HD patients were published from Arab countries.[27-29] A cross-sectional study in Jordan used SGA to assess nutritional status among HD patients found that 50% of female patients were malnourished and 75% of male patients were malnourished. The authors of the study concluded that there were significant differences in the prevalence of malnutrition

Table 5. Correlation between SGA score and biochemical tests.

Variable	*P*
Potassium level vs. SGA	0.134
Calcium level vs. SGA	0.883
Hemoglobin vs. SGA	0.019
Albumin vs. SGA	0.282
Phosphate level vs. SGA	0.419

SGA: Subjective Global Assessment.

Table 6. Multivariate analysis of factors associated with SGA scores.

Variable	Unstandardized Coefficients B	Standardized Coefficients Beta	*P*	95.0% Confidence Interval for B
Presence of other comorbid diseases	.195	0.100	0.523	−0.4–0.8
Level of education	.346	0.163	0.091	−0.1–0.7
Hypertension	-.037	−0.021	0.891	−0.6–0.5
Diabetes mellitus	-.206	−0.120	0.321	−0.6–0.2
Occupation	-.425	−0.157	0.112	−0.9–0.1

SGA: Subjective Global Assessment.

and Hb levels were significantly associated with malnutrition.[20] Another Jordanian study found that 62% of HD patients had malnutrition.[30] A study in Iraq showed that the majority of studied patients were also malnourished.[31] A second study from Iraq on HD patients indicated that malnutrition was present in 63.5% of patients with no significant gender differences.[32] Studies from Saudi Arabia showed that malnutrition in HD patients was generally lower than that reported in Jordanian and Iraqi studies. A study carried out in Riyadh indicated a prevalence of 32% of HD patients with malnutrition.[27] A second study from Saudi Arabia carried out in Jeddah indicated that 55% of HD patients were malnourished.[21] As can be seen from results listed from other Arab countries, the data from Palestine were lower than that reported by Jordanian and Iraqi researchers and somewhat closer to that reported by Saudi researchers.

Our study indicated that single variables such as presence of comorbid diseases, particularly DM or HTN, as well as level of education and type of occupation have a significant effect on nutritional state as assessed by SGA score. The Saudi study carried out in Jeddah found that uneducated HD patients had greater risk of malnutrition. In our study, HD patients with college education had significantly higher SGA score indicative of better nutritional state. Studies have shown that dedicated health-care workers for education patients with HD can improve nutritional state and health outcomes.[33-35] In the Saudi study carried out in Riyadh city, the SGA score was significantly associated with the presence of comorbid diseases. The Riyadh study also found that duration of illness was a significant factor in SGA score. In contrast to Riyadh study, our study showed no effect of duration of illness or gender on SGA score. Similar results regarding gender were obtained in the Baghdad study. The role of age in malnutrition was emphasized in few studies where younger patients had better nutritional state than elderly patients.[36] In our results, age variable showed borderline significance in which younger HD patients showed a higher SGA scores than elderly ones.

In our study, the SGA score was significantly correlated with Hb level but not with albumin level or any other biochemical indicator. It is true that albumin was traditionally used as an indicator for nutrition status in HD patients, but it was shown that albumin test has low sensitivity and specificity for evaluating malnutrition status in HD patients.[37] Albumin test is highly affected by the presence of inflammation which is commonly present in HD patients.[38-40] Therefore, it was not surprising that our results showed no significant correlation between SGA score and albumin level given the cross-sectional nature of our study and the confounding factors that could influence the albumin level such as inflammation which differs among the studied HD patients.

Our study, despite being the first in Palestine, had a few limitations such as the inability of researchers to obtain anthropometric values which have been used as an index of malnutrition. Second, studies on nutritional status are better performed on prospective design to accurately follow-up changes in diet and disease state of the patients. Inflammatory

markers were also needed to be obtained in order to have better overall clinical picture of the patients and in order to facilitate the interpretation of albumin level variations. This study can be considered as a pilot study for future prospective studies that will include HD patients from all centers in Palestine. Therefore, despite those limitations present, our study will serve as a baseline for future studies and will send signals to health policy-makers regarding the nutritional aspects in HD patients and the need for better diet follow-up and consultation in HD centers in Palestine.

Conclusion

Assessment of nutritional status among HD patients is an important issue and needs to be followed up by health-care team in HD centers. The use of a valid and easy scale such as SGA score may provide a quick and valid picture on the nutritional status of HD patients. The use of SGA scale is considered a practical method given the lack of a single and strong biochemical predictor of nutritional status of HD patients. Patients with comorbid conditions such as DM or HTN need extra care in this regard due to multiple food restrictions which might escalate the malnutrition condition in HD patients.

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Conflict of interest: None declared.

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