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RESEARCH ARTICLE

Study of the nutritional status of end-stage renal disease patients on maintenance hemodialysis in Hawary Kidney center and nephrology unit at Benghazi Medical Center

Safia S. Elramli

[1]Assistant Professor, Nutrition department, faculty of Public Health, University of Benghazi) Afaf Omer Sati, Ebtesam Mostafa , Norhan Elhassi(Public Health Students

Abstract
Background: Malnutrition, which is a powerful predictor of morbidity and mortality, is common in patients undergoing hemodialysis. There-fore, adequate nutrition is very important for such patients. Nutritional management in hemodialysis patients is a very important factor for prognosis , a better overall outcome and quality of life.
Objectives: The current study mainly aimed to determine the nutritional status and prevalence of malnutrition and to investigate the relationship between nutritional markers, anthropometric parameters such as body mass index (BMI), and routine laboratory parameters with SGA in patients undergoing hemodialysis.
Patients and Methods: A cross-sectional study was carried out on HD patients in Hawari Nephro Center and Nephro Unit of Beng-hazi Medical Center from December 2019 to January 2020. A total of 155 HD patients were recruited for this study and assessed for nutritional status include both Male and females aged 18 years and over with regular hemodialysis. Outcome measures: Measurements included questionnaire that elicited information on social demographic characteristics, Patient's medical history , and duration of hemodialysis. Anthropometry, biochemical parameters were measured. 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. Data were analyzed using descriptive statistics. The Chi-Square test was applied to examine the study data.
Results: Data shows that 58% of HDP were well-nourished while the remaining 39%, 3%had mild-to-severe malnutrition. Regarding the prevalence of malnutrition in both gender, males group was mor preva-lent of malnourished than female group. SGA score results indicated some significant correlations with patient's post dialysis BMI and albu-min ,however, there was a negative correlation between demographic characteristics as gender, income, education level, comorbid disease , clinical variable such as duration and frequency of HD and some biochemical tests as electrolytes, phosphorous ,hemoglobin, cholesterolwith SGA scores. In addition, results show that insignificant correlation between nutrients intake, meals pattern of HD patients with SGA.
Conclusions: Observations of nutritional status are necessary to maintain the health status of dialysis patients. Every strategy should be used to avoid complications of hemodialysis manifested in uremic state including anorexia, nausea, vomiting leading to malnutrition, fluid and electrolyte imbalance leading to volume overload, hyperkalemia, metabolic acidosis, and hyperphosphatemia, as well as abnormalities related to hormonal or systemic dysfunction such as hypertension, anemia, hyperlipidemia, and bone disease, Timely diagnosis of protein-energy-wasting (PEW) is important for early initiation of nutritional intervention and treatment. In addition, education plans should be prepared to mediate the nutrient intakes and identify the patient's difficulties and provide practical help.

Keywords: Renal dialysis, Nutritional status, Hemodialysis, Malnutrition

1 | INTRODUCTION

One expanding global public health challenge is chronic kidney disease (CKD) , which is manifested by an irreversible deterioration of kidney function that may eventually lead to end-stage renal disease (ESRD) and require renal replacement therapy such as renal transplantation or hemodialysis (HD) [1]. The main aim of HD is to rebalance the intracellular and extracellular fluid volume that is a characteristic function of normal kidneys. This is performed by transporting solutes (i.e. urea) from the blood to the dialysate and by transporting solutes (i.e. bicarbonate) from the dialysate to the blood [1].

kidney dysfunction is associated with defects in acid excretion, systemic inflammation, end-organ hormone resistance and uremic toxin accumulation. These abnormalities can further worsen kidney function, creating a vicious circle, adversely affect patients' outcome[2].

2 | CAUSES OF NUTRITIONAL DISORDER IN HD

2.1 | Inadequate food intake

In dialysis patients, the decrease in food intake is a major cause of PEW and mortality [3]. Multiple factors have been implicated .Major causes of feeding restriction are comorbidities mainly cardiovascular disease and history of volume overload , hospitalizations, depression, low social status, dietary restrictions , multiple medical treatments, and accumulation of uremic toxic molecule[3]

2.2 | Abnormal nutrient metabolism

Energy metabolism: Most studies on resting energy expenditure (REE) measurements in HD and PD patients reported REE values similar to that of controls [4]. In two studies, REE was found to be increased [3], and in one study in malnourished HD patients, REE was found to be decreased [4]. Regarding the determinants of REE, it was shown that severe hyperparathyroidism , elevated serum CRP and serum IL-6 were associated with increased REE.

Amino acid and protein metabolism: In HD patients, plasma concentrations of amino acids(AAs) are characterized by a relative decrease in plasma serine and essential AAs except methionine, and an increase in citrulline and aspartate . Tyrosine and histidine are considered as essential AAs in renal failure [5]. These disturbances of plasma AAs during chronic kidney disease (CKD) have been attributed to the abnormal handling of AAs not only in the kidneys but also in the hepatosplanchnic area[5].

Protein-energy malnutrition is a common problem among patients on hemodialysis (HD). Malnutrition can occur in up to 40% of the patients with renal failure and is associated with increased mortality and morbidity. Therefore, management of the nutritional aspects of patients with chronic kidney disease (CKD) presents a number of challenges [6].

In hemodialysis patients (HDP), it is important to perform an early diagnosis of malnutrition (MN) and inflammation, which are represented by protein-energy wasting (PEW) as they are significant predictors of mortality , using the best clinically available tools to create specific nutritional strategies that can predict outcomes, evaluate therapeutic responses, and avoid severe nutritional deterioration [7]. This adds to the importance and significance of the presence of nutrition specialists in HD center for early detection of malnutrition and strategies to be implemented to prevent further deterioration [8].

The pathogenesis of malnutrition in dialysis patients

The causes of both malnutrition and inflammation are numerous in chronic renal injury (CRI)patients with elevated serum levels of C-reactive protein(CRP) and pro-inflammatory cytokines. Patients may not ingest sufficient amounts of food because of loss of appetite. Anorexia can be caused by factors such as the retention of uraemic toxins and chronic metabolic acidosis, which, moreover, is an important

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catabolic factor [9]. In this regard, inadequacy of dialysis treatment may be an important cause of malnutrition. Renal replacement therapy *per se* causes a loss of nutrients. During a hemodialysis (HD) session, a considerable quantity of amino acids may be lost (4–9 g in the fasting state and 8–12 g postprandially). In contrast, protein losses are negligible, unless multiple re-use of dialysis filters is practiced. HD can cause a loss of vitamins, particularly water-soluble vitamins. Endocrine and metabolic disturbances of uremia, in particular insulin resistance, can reduce protein anabolism and favor catabolism. The role of psychological factors (depression) and socio-economic factors (loneliness, invalidity, poverty) should never be neglected, considering that at present the majority of the dialysis population is composed of elderly patients [9]. Acute concurrent illnesses can also contribute to malnutrition. Finally, inadequate dietary prescription, due to the traditional physician's preference of prescribing nutritional restriction rather than providing nutritional counselling, can further worsen malnutrition [9].The pathogenesis of chronic systemic inflammation in dialysis patients, which is associated with hyper catabolism and body wasting, is complex and not yet fully understood. Other non-dialysis related causes of elevated CRP include co-morbid conditions, e.g. chronic heart failure with edema and the atherosclerotic process [10]. Moreover, various chronic infections, such as *Chlamydia pneumoniae* and dental or gingival infections may also contribute [10]. Furthermore, it has been suggested that factors related to the dialysis procedure itself may contribute to maintaining chronic systemic inflammation. In order to prevent and treat malnutrition in dialysis patients, it is important to assess appropriately the nutritional status and to identify patients at risk [10].

Methods to assess nutritional status in dialysis patients

There is a single best nutritional marker in patients with CRI, but that several nutritional markers should be evaluated together. The assessment of nutritional status should be based on a combination of clinical parameters with biophysical and biochemical parameters[11]. Malnourished dialysis patients often have protein energy malnutrition with a reduction of both fat mass (FM) and lean body mass (LBM). Therefore, clinical assessment of subcutaneous FM and muscle mass and a history of weight loss are important parts of routine nutritional assessment. Percentage of standard weight and body mass index (BMI) are also important and easy to measure, although BMI is more useful for assessment of obesity than of malnutrition. Most dialysis patients with malnutrition also have co-morbid diseases, in particular cardiovascular disease and inflammation, and the assessment of co-morbid conditions is an important part of the nutritional assessment of dialysis patients [11]. Laboratory parameters used in clinical routine, such as proteins, serum levels of C-reactive protein (CRP) and lipid profile may be influenced in HD patients by the inflammatory condition [11]. Furthermore, it should be noted that other parameters, such as serum cholesterol concentration, experience a reverse epidemiology in patients onHD. However, both serum prealbumin levels in early stages of malnutrition and those of albumin (much later) are good nutritional markers [12]. During recent years, subjective global assessment of nutritional status (SGA) has been used increasingly to assess nutritional status in many studies of dialysis patients (mainly cross-sectional studies) and in patients with CRI at start of dialysis therapy [13]. SGA correlates well with other nutritional markers in patients with CRI .Furthermore, it has a high predictive value for mortality in these patient groups . However, one potential problem with SGA is its subjective nature, which may reduce its reproducibility, thus small differences in SGA score must be interpreted with great caution [13].

3 | AIM AND OBJECTIVES

The aim of this study was to study the prevalence of malnutrition among hemodialysis patients.

Objectives

1.To determine the prevalence of nutritional disorders (malnutrition, anemia, hypernatremia, hyperkalemia, and hyperphosphatemia)

2.To show the association between nutritional status and regular hemodialysis in both gender

3.To identify the effects of demographic characteristics, chronic disease of HD patients on nutritional status

34To find out wither the frequency and duration of dialysis session per week are effect on nutritional status of HD patients

5.To determine whether nutritional status decline over time in patients receiving dialysis

4 | METHODOLOGY

Design:

It was cross-sectional study random sample conducted at Nephrology unit of Benghazi Medical Centre and Hawari Nephrology Center – Libya, to determine the nutritional status of end-stage renal disease patients on maintenance hemodialysis aged from 18 to 83 years old. The access to this study was obtained following ethical approval after consultation with and permission of local medical research ethics committee, senior management, and site managers at Benghazi Medical Centre and Howari Nephrology Center. Total sample was 155 patients includes both Male and females aged 18 years and over with regular hemodialysis .

Criteria for inclusion the study

The target of study consisted of patients with ESRF with maintenance hemodialysis both male and female with Libyan nationality. All enrolled patients should have completed a minimum of three months duration on HD

Exclusion criteria:

Patients had acute renal failure on hemodialysis , any patient with chronic renal failure or end stage renal failure did not start of hemodialysis , as well as patients on temporary hemodialysis due to other cause than renal failure. Patients who were hospitalized for more than two weeks for a non-vascular access complication or had signs of active infection were excluded from the study

Patients from other nationality other than Libyan nationality or patients younger than 18 years old were excluded.

Procedure and materials:The study will be carried out over 2 months period from December 2019 to January 2020 and included 155 patients with a mean age of 47.8 ; there were 92(59.4%) males and 63(40.6%) females .

The researcher will seek approval to conduct the study and to discuss access with site mangers. Researchers should be set to meet with participants to discuss the study, obtaining an informed consent, measurements, and data collections. Researchers were set to meet with participants, the study was explained, and an informed consent obtained. A complete social and medical history , including details of the patient's diet using 24 hours recall method and food frequency questionnaire , physical examination, and recording of the dry body weight was performed to calculate BMI . Biochemical tests were obtained during the study period from medical files of the studied patients. The baseline laboratory tests included serum hemoglobin ,serum albumin, [total cholesterol, serum creatinine, CRP, serum potassium ,sodium, calcium and phosphorus, and serum urea nitrogen.

Assessment of nutritional status

As no single measure predicts overall nutritional status in patients with HD, a multidimensional approach has been proposed to include measurement of body composition, dietary intake, biochemical measures and muscle strength . However, this is clearly not practical for all patients in routine clinical practice and therefore the use of nutritional screening tools, such as Subjective Global Assessment (SGA) which incorporates important measures such as body mass index should be applied to the general HD patients to identify patients at risk of malnutrition. Selected patients should then undergo more detailed assessment, including dietary intake, anthropometric evaluation and measurement of laboratory investigation. Serum albumin level and body mass index (BMI) were the most predictive parameters of malnutrition [14]. However, the nutritional status of patients was assessed by extensive anthropometric measurements .Whereas the biochemical markers of nutrition such as serum albumin, S. creatinine, CRP ,S. cholesterol was unavailable for most patients as well as the detection of malnutrition can be problematic in HD

patients as the body weight is influenced by fluid status and biochemical markers such as albumin, CRP and haemoglobin are affected by the disease process. In clinical practice, Therefore review of the patients albumin level, and body weight include recent changes and their dietary intake is approve helpful [14].

5 | RESULT

The aim of this study was to assessment the nutritional status and prevalence of malnutrition among hemodialysis patients in Howari Nephrology Center and Nephrology Unit of BMC Hospital in Benghazi.

1.DESCRIPTION OF STUDY PARTICIPAMNTS

The background characteristics of the participants are summarized in Table (4.1.and 4.2)

A total of 155 HD patients in this study were recruited for the study, the age ranges was between (18-83 years), the mean age was 47.48 , included 92 males and 63 females

Table (4.1)distribution of age

	N	Minimum	Maximum	Mean	Std. Deviation
patient age	155	18	83	47.48	14.804
Valid N (list wise)	155				

Table(4.2) distribution of gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	92	59.4	59.4	59.4
	female	63	40.6	40.6	100.0
	Total	155	100.0	100.0	

2. Demographic characteristicand clinical information of the studied patients

All participants enrolment in this study were on regular dialysis. approximately 23.9% did not earn an income (either unemployed or a housewife), and Most patients (29%)had a monthly income of 500-1000dinner ,while only 7% had income ,1500 dinner as shows in table(4.3)

Regarding the patient's educational level, approximately 54.2% ,whereas 45.2% were illiterates as demonstrated in table(4.3)

clinical information of the studied patients is presented in table(4,3) . most (56.8%) of studied HD patients reported that they have been do surgeries ,however, about 43,2% they do not. Table (4,3) demonstrated that the highest percent of participants were have family history for chronic disease which was 60% ,while only 40% did not found history of chronic disease. and approximately 72% of the studied patients reported did not having family history of renal disease , only 27.3 confirmed with family history of renal disease. Comorbid conditions in the study patients were mainly hypertension (HTN)94 (60.6%) followed by diabetes mellitus (DM) 23(14.8%). A bout 23 (14.8%) of the patients had both DM and HTN. Overall, 13(8.4%)of HD patients did not have any comorbid condition.

Table(4,3) Demographic characteristic and clinical information of participants

characteristic	*No. (%)*
Past surgery	
Yes	*(56.8)88*
No	*(43.2)67*
Chronic disease	
No	*13(8.4)*
Hypertension	*94(60.6)*
diabetes	*(14.8)23*
heart disease	*(1.3)2*
Both diabetes and pressure	*(14.8)23*
	–
Causes of ESRD	
Hypertension	*71(46.5)*
Diabetes	*10(6.5)*
Kidney stones	*)9.014(*
Inheritance or genetics	*7.1(9%)*
Deformation from birth	*)1.93(*
accident	*)2.64(*
SLE	*)3.25(*
Cold	*)1.32(*
unknown	*32(20.6)*
gout	*)1.32(*

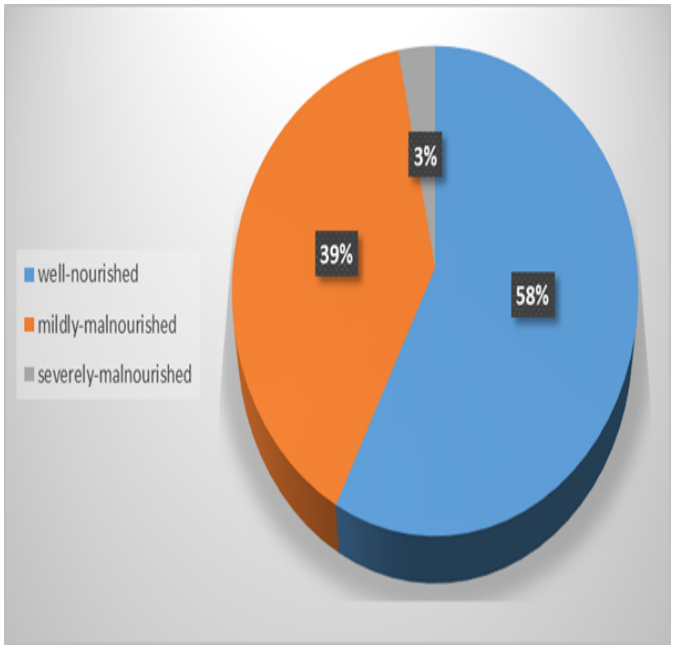
Frequency	
2 day	*–*
3 day	*2(1.3)*
	)98.1152(
Duration	
3 h	*)19.430(*
4 h	*)79.4123(*
Family chronic disease	
Yes	*93(60)*
No	*62(40)*
Family renal disease	
Yes	*(27.3)43*
No	*(72.3)112*
Education level	
Educated	*(84) 54.2*
Illtreat	*(70)45.2*
Family income	
No income	*37(23.9)*
Less than 500 dinar	*32(20.6)*
500-1000 dinar	*45(29)*
1000-1500 dinar	*23(14.8)*
More than 1500	*12(7.7)*

6 | ASSESSMENT OF NUTRITIONAL STATUS OF HD. PATIENTS

6.1 | Prevalence of malnutrition using Subjective Global Assessment

Subjective Global Assessment (SGA) score that was originally developed to assess post-operative nutritional state and 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 . The SGA comprises of five criteria, and includes medical history, physical examination, subcutaneous fat, muscle wasting and fluid retention. A score A indicated well nourished , score B mildly to moderately malnourished ,score C severely malnourished .

The nutritional status of the patients indicated that (58%) were well-nourished while the remaining (39%, 3%) had mild-to-severe malnutrition [Figure 4,1] below.



(figure 4.1) Prevalence of malnutrition among HD patients

6.2 | Body mass index in the study patients

Regarding the patient's post dialysis BMI 43.3% were had normal BMI , 28.4% were overweight ,while 16.1%,7.1%,1.9% were grad1,2,and 3 obese respectively . however, 4.5% appeared to be under weight . The figure (4.2)shows all previously mentioned.

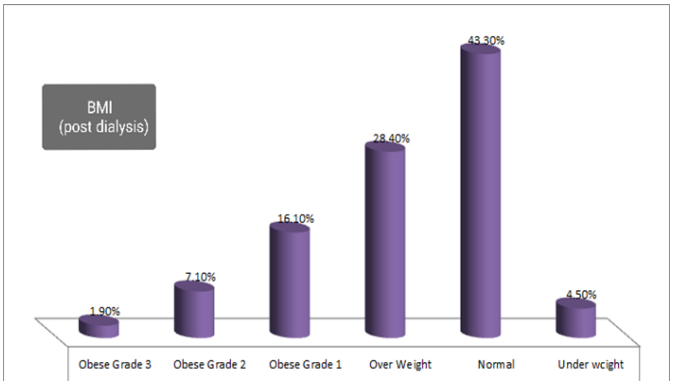


Figure (4.2)Post- dialysis BMI of study patients

6.3 | BMI and SGA score

Based on the results (table4.4) there was showed the post dialysis BMI had a highly significant association with SGA scores { P-value 0.29}.

Table (4,4) correlation between post-dialysis BMI and SGA

		SGA	BMI post
Subjective global assessment	Pearson Correlation	1	-.175-*
	Sig. (2-tailed)		.029
	N	155	155
BMI post	Pearson Correlation	-.175-*	1
	Sig. (2-tailed)	***.029***	
	N	***155***	***155***

3.4. frequency of dialysis : Based on the results (table 4,14)there was no association between frequency of dialysis and SGA

(P value-0.578).

Table(4,5) Correlation between frequency of hemodialysis and SGA score

		SGA	Frequency of hemodialysis
Subjective global assessment	Pearson Correlation	1	-.045-
	Sig. (2-tailed)		.578
	N	155	155
Frequency of hemodialysis	Pearson Correlation	-.045-	1
	Sig. (2-tailed)	.578	
	N	155	155

6.4 | laboratory investigation

Result revealed that hemoglobin level regarding both sex , the mean level of HBG among male group was 9.9ml/dl as well as the minimum level was 5.4ml/dl while the maximum level was 16.8ml/dl. About female group the mean HBG level was 9.5 while the maximum and minimum HBG level was 13.3 ml/dl and 9.5 respectively.

Table (4,6) Hemoglobin level among gender

		hemoglobin		
		Mean	Maximum	Minimum
gender	male	9.9	16.8	5.4
	female	9.5	13.3	7.0

Table(4,7) laboratory result among both sex

		serum Na	serum K	serum Ca	serum Ph.	creatinine	serum urea nitrogen
gender	male Mean	136.5	5.0	9.1	6.0	10.8	137
	male Maximum	144.0	8.0	12.0	10.3	18.0	239
	male Minimum	126.0	.0	6.0	3.0	4.6	56
	female Mean	137.0	5.2	9.1	6.1	8.9	132
	female Maximum	145.0	10.8	12.0	11.5	15.4	308
	female Minimum	130.0	3.2	6.0	2.5	2.7	55

Regarding biochemical indexes of nutritional status the table below(4,7) shows that the maximum and minimum level of serum cholesterol among male group was 198 ml/dl and 160ml/dl, whereas the maximum and minimum level among female group was 254ml/dl and 170 respectively

We noted that all patients in our sample had hypercholesterolemia compared with normal level ,whereas urine albumin was high at maximum level in both groups. High loss of albumin in urine is marker of malnutrition.

Table(4,7) serum cholesterol-albumin in both sex

		cholesterol	serum albumin
	Mean	179.6	3.8
male	Maximum	198.0	6.8
	Minimum	160	3.0
	Mean	212	3.8
gender			
female	Maximum	254 .	9.8
	Minimum	170	3.0

Correlation between SGA score and biochemical tests

Correlational analysis was carried out between SGA scores and laboratory results correlation (Table4,8) No significant correlation was found between SGA score and potassium level ($P = 0.889$), sodium level ($P = 0.400$), hemoglobin ($P = 0.706$),cholesterol level(p=0.764) and phosphate level ($P = 0.562$). However, significant positive correlation was found between SGA core and albumin level ($P = 0.031$).

Table(4,8) Correlation between SGA and biochemical test

Variable	
Sodium level vs SGA	0.400
Potassium level vs SGA	0.889
Phosphors level vs SGA	0.562
Albumin level vs SGA	0.031
Hemoglobin level vs SGA	0.706
Cholesterol level vs SGA	0.764

6.5 | Association between nutrient intake and SGA

Table 4.9 below shows the association between nutrients intake among HD patients and SGA parameters, based on result was showed a negative correlation , the correlation between SGA scores and protein (p =0.652),calorie (p=0.998),CHO(p=0.575),and fat(p=0.932).

Table (4,9)): Association between SGA scores and daily nutrient intake

VARIABLE	P value
Protein Vs SGA	0.652
calorie Vs SGA	0.998
carbohydrate Vs SGA	0.575
Fat Vs SGA	0.932

7 | 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. Nutritional status is an important predictor of outcome in ESRD patients on maintenance HD. Assessment of the nutritional status needs a systematic nutritional evaluation based on anthropometric, laboratory, and clinical parameters from which a malnutrition score can be calculated.

With regard to association between BMI and SGA score our result illustrated that 43.3% HD patients post dialysis BMI were had normal and most of them were well-nourished, while patients with underweight were severely malnourished. In addition, the result demonstrated that there was showed post dialysis BMI had a highly significant association with SGA scores with P-value 0.29. Similarly, study done by Ekramzade et al. reported that HDP with MN had a lower BMI than well-nourished patients [15].

Another study was done by . Mohammed (2014) convinced that post dialysis BMI had high significant association with SGA [16]

On the other hand, our results disagreed with the study of Ghali and Malik,[17] there was no significant effect of post dialysis BMI and SGA . About frequency of dialysis , In present study most of participants in our sample were dialysis for 3 times a week was well nourished while the rest of them were mildly malnourished and five patients had sever malnourished among those patients also the result showed that frequency of hemodialysis non-significant correlation with SGA. However, study was done by Bohé and Rennie (2006) [18]provided a significant analysis and discussion on the subject and reported that patients receiving dialysis three times a week lost 2 kg of lean body mass in a year [18]. Some other studies also found severity of malnourished increased with increased dialysis frequency [19]. As demonstrated in our result, the correlation between SGA scores and laboratory results were No significant was found with potassium level (P = 0.889), sodium level (P = 0.400), hemoglobin (P = 0.706),cholesterol level(p=0.764) and phosphate level (P = 0.562). However, significant positive correlation was found between SGA core and albumin level. In contrast other study by Stosovic etal (2011) have previously found that SGA score was significantly correlated with Hb level but not with albumin level or any other biochemical indicator[20]. The evident poor intake of high quality protein also reported in present study. In this study we also found that the association between nutrients intake among HD patients and SGA parameters was a negative correlation. The correlation between SGA scores and protein (p =0.652),calorie. (p=0.998),CHO(p=0.575),and fat(p=0.932). poor protein and energy intake, comorbidities and inflammation were the predictors of MN in descending order of importance [21]. Morais et al. performed a prospective study to investigate the association between nutritional status and food intake in HDP and the authors reported that nutrients intakes had a significant correlation with subjective global assessment, which was different to our findings reported here [22]. Study was done by Therrien etal (2015) [23] were analyzed nutrient intake of the subjects and found out that calorie and protein intakes were insufficient compared to the dietary intakes recommended for dialysis patients.

8 | CONCLUSIONS

We conclude that the majority of our dialysis patients were well nourished, and followed by mildly malnourished. Poor dietary knowledge and practices were encountered among these patients with poor biochemical parameters among the majority of them. this study showed the majority of patients reported a lower than recommended energy and protein intake

The SGA score results indicated that MN was moderately prevalent among patients undergoing HD. These results show some significant correlations between the nutritional status and patient characteristics (i.e. post dialysis BMI and biochemical tests as albumin) , However , our result shows that HDP had un-significant relation between demographic characteristics , clinical variable and some biochemical tests such as gender, income, education level, comorbid disease , and frequency of HD , electrolytes, phosphorous ,hemoglobin, cholesterol with SGA scores. We also found that a negative correlation between nutrients intake among HD patients with SGA parameters. Therefore, these findings should increase the awareness of healthcare providers for interventions to enhance the nutritional status for HDP, especially those who are elderly, have multiple comorbid diseases, , have a long dialysis vintage or live alone. Consequently, efficient screening in HDP for risk factors of MN and simultaneously performing a nutritional evaluation and assessment whenever possible should facilitate early dietary intervention to avoid further deterioration and nutritional depletion. Further interventional studies should be conducted in different nephrology center in Benghazi and with a larger sample size to repeat these results so that they are proven with greater certainty.

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