

Nutritional Status and Quality of Life among Hemodialysis Patients in Omdurman Military Hospital (Hemodialysis Center) (November 2017–March 2018)

Somiya Gutbi Salim Mohammed¹, Fawzia Abdallah Alsanossi Abdallah²

¹Department of Public Health, University of Bahri/College of Public and Environmental Health/Khartoum North/Sudan, ²Department of Nutrition and Dietetics, Ahfad University for Women/Omdurman, Sudan

ABSTRACT

Background: Hemodialysis treatment provides a progressive improvement in decreasing the risk of mortality and mobility. However, insufficient hemodialysis treatment and hemodialysis-related complications tend to decrease patient's nutritional status and overall quality of life (QoL). **Objective:** The objective of this study was to assess the nutritional status and QoL among hemodialysis patients. **Methodology:** A cross-sectional study was conducted in Omdurman Military Hospital. A total of 96 patients were collected by convenience sampling from hemodialysis center in Military Hospital. **Results:** The results revealed that males were 61.5% of the sample and females were 38.5%, 45.8% of the patients at the age group of 40–59 years. Almost half of the patients were on hemodialysis for more than 3 years (49.1%). The majority of patients (88.5%) underwent two sessions of hemodialysis/week. The results also showed that 55.2% of the patients consumed more than two meals per day. The main comorbidity diseases among the patients were hypertension (63.5%). Regarding BMI, (42.7%) were underweight. No significant differences in the mean values of QoL and BMI classification, length of dialysis, or chronic disease ($P \geq 0.05$). Biochemical investigation revealed that 89.6% of the patients suffered from anemia, and 10.4% were at normal hemoglobin (Hb) level. The result of the analysis showed that dimension of QoL physical health dimension (48.8%) lower than mental health dimension (52.6%), regarding the domains, the highest scale score was mental health domain (63.2%) and the lower was role physical (40.4%). The results revealed significant differences in the mean values of role functioning with a number of meals taken by patients ($P = 0.003$) and the validity with the number of meals ($P = 0.019$). **Conclusion and Recommendation:** The results concluded that patients had inadequate dialysis sessions and did not maintain adequate nutrition. The majority of patients were underweight and had low level of QoL. The study recommended that the health professionals should ideally be familiar with and trained in the application of the QoL assessment tools, which may be valuable in assistance of these patients, even in the earlier stages of disease to allow timely health-care interventions in the course of the disease.

Key words: Body mass index, hemodialysis, kidney failure, quality of life

BACKGROUND

Chronic kidney disease affects 6–15% of the worldwide population, i.e., approximately 600 million people. According to the World Health Organization^[1] estimates, the number of hemodialysis and peritoneal dialysis patients will grow to 5.5 million by 2030. Chronic kidney disease is a progressive syndrome in which the kidneys

lose their ability to filter blood, concentrate urine, excrete wastes, and maintain electrolyte balance. End-stage renal disease (ESRD) is the end result of many forms of chronic kidney diseases, also defined as glomerular filtration rate of $<15 \text{ mL/min/1.73 m}^2$, with the presence of signs and symptoms of uremia.^[2,3] Dialysis is a treatment which removes waste products normally filtered by the kidney from the blood. It is used for people who have kidney

Address for correspondence: Dr. SomiyaGutbi Salim Mohammed, Department of Public Health, University of Bahri/ College of Public and Environmental Health/Khartoum North/Sudan. E-mail: somiyagutbi@gmail.com

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failure.^[3] Proper nutrition is even more important for those people as they must ensure that unnecessary waste products are not added to their system through their diet.^[4] Chronic kidney disease affects physical fitness and restricts social and professional activity. The disease forces a limitation on normal functioning and requires frequent hospitalization. Therefore, acceptance of illness (AI) is important, as it allows the patient to adjust to their new situation and alleviates negative emotion.^[5] Better AI minimizes the time required for adaptation to the limitations resulting from impaired health, reduces psychological discomfort, and contributes to a patient better quality of life (QoL). Studies on hemodialysis patients have shown that they have a poorer perception of their QoL than healthy individuals.^[6] In other studies, the significant decrease in dialysis patients' QoL was due to worse physical fitness and increased anxiety and depression symptoms. A significantly lower QoL is observed in hemodialysis patients, compared with those treated with peritoneal dialysis or renal transplantation.^[7]

Statement of the problem

According to the latest WHO data published in 2017 kidney disease deaths in Sudan reached 5905 or 2.21% of total deaths. The age-adjusted death rate is 27.26 per 100,000 of population ranks Sudan 34 in the world.^[8] Chronic kidney failure in Sudan affects the economically productive age group; unemployment rate is high among ESRF patients. The study showed that hypertension and diabetes mellitus are the leading cause of ESRF among patients over 40 years old in Sudan followed by chronic glomerulonephritis.^[9] A significant part of the patient treatment process in chronic kidney failure is the maintenance and/or recovery of independent functioning in daily life. In chronic diseases, QoL depends on disease type, time of onset, symptom intensity, treatment options, dietary intake, side effects, and limitations resulting from the disease, the patient's age and self-care capabilities.^[10] Patients treated with hemodialysis are a special group of chronically ill, who are at risk of frequent hospitalizations and multiple disorders due to the renal dysfunction and to the hemodialysis treatment itself.^[9]

Justification

Both nutritional status and QoL were the main outcomes of HD treatment that influenced patients' general health status. Nutritional status is an important factor that determines the overall QoL of patients undergoing dialysis treatment. Several studies outside Sudan reported that nutritional markers such as body mass index (BMI), cholesterol, serum albumin, Hb, as well as dietary intakes may influence QoL. In Sudan, assessment of quality of life for patient undergoing hemodialysis is relatively new subject, that has recently gained popularity, there is no published data regarding the nutrition status of hemodialysis patients and their quality of life. Assessment of health-related QoL is a predictive indicator of the outcome of the disease as well as a valuable

research tool in assessing the effectiveness of therapeutic intervention, patients' survival, and hospitalization.

General objective

The general objective of this study was to assess the nutritional status and QoL among adult patients undergoing hemodialysis (20–65 years), in Omdurman Military Hospital.

Specific objectives

The specific objectives of this study were as follows:

- To determine the prevalence of undernutrition among hemodialysis adult patients.
- To assess nutritional status using dietary intake by 24 h. Recall, biochemical data (Hb and renal function test) and anthropometrics measurement (weight [Wt.], height [Ht], and BMI).
- To assess the level of QoL using kidney disease QoL (KDQOL 36_SF).

METHODOLOGY

The study was a cross-sectional study conducted at Omdurman Military Hospital in hemodialysis center. The study population was including the entire patients of end-stage renal failure attending the hospital for dialysis during the period of the study (November 2017–March 2018).

Sample was collected by convenience sampling; all ESRD patients on regular HD attended the center for dialysis during the data collection period (November–March 2017).

RESULTS

General information about the patients is shown in Table 1. Males were 61.5% and females were 38.5%. Regarding age of the patients, 45.8% at the age group of 40–59 years old and 27.1% at the age group of both 20–39 and 60–65 years old. As for marital status, 75% of the patients were married, 18.8% single, 4.2% divorced, and 2.1% were widow/er. Slightly above one-third of the sample, 37.5% had secondary level of education, 22.9% primary education, 19.8% had university/postgraduates, 14.6% were illiterate, and 5.2% had khalwa education. Concerning the occupation, 42.7% were unemployed, 19.8% employees, 18.8% self-employees, 16.7% housewives, and 2.1% were students. Nearly three-fourth of the subjects had owned houses (72.9%), 21.9% were renting, and 5.2% lived in governmental houses.

According to Table 2, the comorbid diseases among the patients in the present study included hypertension (63.5%), hypertension with diabetes mellitus (13.5%), diabetes mellitus (1%), and cardiovascular disease (1%). On the other hand, 21% of the patients did not have comorbid diseases, 70.8%

Table 1: Basic information about the patients

Parameter	Indicator	n (%)
Sex	Female	59 (61.5)
	Male	37 (38.5)
Age group	20–39	26 (27.1)
	40–59	44 (45.8)
	60–65	26 (27.1)
Marital status	Single	18 (18.8)
	Married	72 (75.0)
	Divorced	4 (4.2)
	Widower	2 (2.1)
Occupation	Unemployed	41 (42.7)
	Employee	19 (19.8)
	Self-employed	18.8
	Student	2 (2.1)
	Housewife	16 (16.7)
House	Own	70 (72.9)
	Rent	21 (21.9)
	Governmental	5 (5.2)
Education	Illiterate	14 (14.6)
	Khalwa	5 (5.2)
	Primary	22 (22.9)
	Secondary	36 (37.5)
	University/postgraduates	19 (19.8)

Table 2: Distribution of the patients according to co-morbidity, family history, length & duration of dialyses and intake of medications

Parameter	Indicator	n (%)
Chronic disease	Diabetes	1 (1.0)
	Hypertension	61 (63.5)
	Diabetes and hypertension	13 (13.5)
	Cardiovascular	1 (1.0)
	None	20 (21)
Family history	Yes	28 (29.2)
	No	68 (70.8)
Length of dialysis (years)	1<2	32 (33.3)
	2<3	17 (17.7)
	>3	47 (49.0)
Duration of dialysis/week	2 sessions	85 (88.5)
	3 sessions	11 (11.5)
Intake of medications	Always	80 (83.3)
	Sometime	14 (14.6)
	Rare	2 (2.1)

did not have relatives with ESRD, and 29.2% had relatives with ESRD, 49% of the patients were on hemodialysis for >3 years, 33.3% for 1<2 years, and 17.7% for 2<3 years. Regarding duration of sessions, (88.5%) of patients were having two sessions of hemodialysis per week, and only (11.5%) were having three sessions. As for medication, 83.3% of the patients were always took their medications, 14.6% were sometimes took their medication, and only 2.1% were rare took.

Results in Table 3 show that 55.2% of the patients ate >2 meals per day, 39.6% ate two meals, and 5.2% ate 1 meal/day, 88.5% did not have allergy of food, and 11.5% had allergy for some kind of food such as egg, banana, eggplant, and lentil. Regarding eating habits, 80.2% of the patients were eating with their family and 19.8% were eating alone. Concerning source of diet taken by the patients, 71.9% of patients had hospital diet, 18.8% brought home food, 9.4% brought food from the market, 51% had extra food beside hospital food, and 49% did not have extra food beside hospital food.

Table 4 shows that all of the patients received dietary advice during admission in the hospital from dietitian, regarding

Table 3: Health and nutrition behavior

Parameter	Indicator	n (%)
Source of water	Tap water	87 (90.6)
	Water pump	4 (4.2)
	Wells	5 (5.2)
Number of meals	1 meal	5 (5.2)
	2 meals	38 (39.6)
	>2 meals	53 (55.2)
Food allergy	Yes	11 (11.5)
	No	85 (88.5)
Eat alone	Yes	19 (19.8)
	No	77 (80.2)
Source of diet in dialysis day	Home	18 (18.8)
	Hospital	69 (71.9)
	Market	9 (9.4)
Extra food	Yes	49 (51.0)
	No	47 (49)

Table 4: Distribution of the patients according to the reception of dietary advices

Parameter	Indicator	n (%)
Received nutrition advice	Nutritionist	96 (100.0)
Following advice	Always	58 (60.4)
	Sometime	34 (35.4)
	Never	4 (4.2)

following the dietary advice, 60.4% always followed these advices, 35.4% were sometimes followed advice, and 4.2% never followed dietary advices.

Table 5 demonstrates that the mean weight, height, and BMI were 60.09 ± 15.7 kg, 1.74 ± 9 m, and 19.76 ± 4.72 kg/m², respectively.

Table 6 reveals that 42.7% of the patients were underweight, 43.8% had normal weight, 11.4% were overweight, and 2.1%

Table 5: Anthropometric measurements

Parameter	Result
Weight (kg)	60.09±15.7
Height (m)	1.74±9
BMI (kg/m ²)	19.76±4.72

BMI: Body mass index

Table 6: Mean of BMI classification

Underweight	42.7% (41)
Normal	43.8% (42)
Overweight	11.4% (11)
Obese	2.1% (2)

BMI: Body mass index

Table 7: Mean of nutrients intake

Parameter	Mean±standard deviation
Energy (kcal)	1103.3±346.1
Protein (g)	47.4±18.5
Animal protein intake (g)	25.1±16.9
CHO (g)	162.3±56.9
Fat (g)	29.93±12.4

Table 8: Adequacy (%) of energy and protein by BMI status

BMI status	BMI	Energy (kcal)			Protein (g)		
		Intake	Adequacy %	Inadequacy %	Intake	Adequacy %	Inadequacy %
Underweight	15.610	1089.24	39.0	61.0	49.59	46.3	53.7
Normal	21.181	1085.26	50.0	50.0	44.50	61.9	38.1
Overweight	26.962	1152.82	54.5	45.5	47.45	63.6	36.4
Obese	35.156	1498.50	0	100.0	63.00	0	100.0

BMI: Body mass index

Table 9: Distribution of the patients according to mean differences in 24 h recall by gender

Gender	Energy (kcal)	Protein (g)	CHO	Fat
Male	1153.69	49.8	168.5	31.0
Female	1022.97	43.6	152.4	28.2
Total mean for both	1103.31	47.4	162.3	29.9

P ≥ 0.05

were obese.

Table 7 demonstrates that the mean energy, protein, animal protein, CHO, and fat were 1103.3 kcal ± 346.1 (kcal), 47.4 ± 18.5 (g), 25.1 ± 16.9 (g), 162.3 ± 56.9 (g), and 29.93 ± 12.4 (g), respectively.

Table 8 reveals that mean energy and protein intake for the different BMI categories' were 1089.24 kcal and 49.59 g, for the underweight, 1085.26 kcal and 44.50 g for normal weight, 1152.82 kcal and 47.45 g for overweight, and 1498.50 kcal and 63.0 g for obese patient, respectively.

Table 9 demonstrates that the mean values for 24 h recall for males were 1153.69 kcal, 168.5 g, 49.8 g, and 31 g for energy, carbohydrates, protein, and fat, respectively; on the other hand, the mean values of 24 h recall for females were 1022.97 kcal, 152.4g, 43.6g, and 28.2 g for energy, carbohydrates, protein, and fat, respectively. No significant differences in energy, protein fat, and carbohydrates intake between males and females P value ≥ 0.05.

Table 10 reveals that, energy intake was 51.7% for males and 53.4% for females and both of them had protein intake with 66%.

According to biochemical investigation, Table 11 reveals that the mean values of Hb were 8.8. g, 86.4% of the patients had low Hb, 11.5% had normal, and 2.1% had high level of Hb; mean serum calcium was (8.4mg/dL), (55.2% was low, 42.7% normal, and 2.1% was high;) mean serum potassium was (4.9mEq/L) (3.1% low, 79.2% normal, and 17.7% high) and serum creatinine (9.2mg/dL) (97.9% normal and 2.1% high); mean blood urea was (160.3mg/dL) (1% normal and 99 high); mean serum phosphorus was (4.8mg/dL) (1% low, 96.9% normal, and 2.1% high); mean serum sodium was (137.9mEq/L)

Table 10: Adequacy of energy and protein intake by gender

Gender	Mean weight	Energy (kcal/day)			Protein (g/day)		
		Intake	Requirement	%	Intake	Requirement	%
Male	63.5	1153.69	2229	51.7	49.78	76	66
Female	54.7	1022.97	1915	53.4	43.59	66	66

Table 11: Biochemical results

Parameter	Mean	Standard deviation	Low	%	Normal	%	High	%
Hemoglobin(g)	8.8	1.614	83	86.4	11	11.5	2	2.1
Serum calcium(mg/dL)	8.4	1.03	53	55.2	41	42.7	2	2.1
Serum potassium(mEq/L)	4.9	0.93	3	3.1	76	79.2	17	17.7
Serum creatinine(mg/dL)	9.2	2.42	-	-	94	97.9	2	2.1
Blood urea(mg/dL)	160.3	36.70	-	-	1	1	95	99
Serum phosphorus(mg/dL)	4.8	0.81	1	1	93	96.9	2	2.1
Serum sodium(mEq/L)	137.9	3.46	12	12.5	83	86.5	1	1
Uric acid(mg/dL)	7.3	1.62	-	-	50	52.1	46	47.9

Table 12: Hemoglobin distribution

Hemoglobin	Frequency (%)
Anemia	86 (89.6)
Normal	10 (10.4)
Total	96 (100)

Table 13: Distribution of QoL

Parameter	Mean±standard deviation
QoL mean	51.1 (20.44)
Physical health dimension	48.8 (20.23)
Mental health dimension	52.6 (18.36)
Bodily pain	60.2 (27.44)
Role limitation	50.7 (38.41)
MH	63.2 (13.12)
RF	51.0 (29.78)
VT	53.5 (12.46)
GH	44.3 (21.67)
RP	40.4 (38.50)
Physical functioning (FF)	45.3 (29.09)

MH: Mental health, RF: Role functioning, VT: Validity, GH: General health, RP: Role physical, QoL: Quality of life

(12.5% low, 86.5% normal, and 1% high) and mean uric acid was(7.3mg/dL) (52.1% normal and 47.9% high).

Table 12 shows that 89.6% of the patients suffered from anemia and 10.4% were at normal Hb level.

Regarding Table 13, the mean QoL was 51.1% and dimension of QoL physical health dimension (48.8%) was lower than

mental health dimension (52.6%). The domains component of the dimensions, the highest scale score was mental health domain (63.2%), the lower was role physical (40.4%), general health (44.3%), physical functioning (45.3%), role limitation (50.7%), role functioning (RF) (51.0%), validity (53.5%), and bodily pain (60.2%).

Table 14 shows low QoL in both diabetes (1.9%) and coronary heart disease and hypertension (57.7%), both diabetes and hypertension (15.4%), and those with none chronic disease (23.1%); as for moderate QoL, 0 in both diabetes and coronary heart disease, 80.6% in hypertensive patients, and 6.5% in none chronic disease patients; and high percentage of QoL, in hypertension (46.2 %), those with diabetes and hypertension (7.7%), and 0% in those with diabetes and coronary heart disease, no significant differences in the mean values of QoL and chronic disease ($P \geq 0.05$).

Regarding the length of dialysis, Table 15 reveals that the means ± SD of QoL of patient were 56.2 ± 19.05 for 1 < 2 years, 43.7 ± 20.01 for 2 < 3 years, and 50.3 ± 20.98 for >3 years, no significant difference in the mean values of QoL and length of dialysis (years) ($P \geq 0.05$).

Table 16 demonstrates that QoL means among underweight, normal, overweight, and obese were 49.3 ± 20.36, 51.0 ± 20.51, 55.5 ± 21.15, and 65.8 ± 24.49, respectively, no significant differences in the mean values of QoL and BMI classification ($P \geq 0.05$).

Table 17 demonstrates significant differences in the mean values of RF and the number of meals taken by the patients ($P = 0.003$) and validity with a number of meals ($P = 0.019$).

Table 14: Correlation between mean of QoL and chronic disease

Chronic disease	QoL		
	Low (%)	Moderate (%)	High (%)
Diabetes	1.9	0	0
Hypertension	57.7	80.6	46.2
Diabetes and hypertension	15.4	12.9	7.7
Coronary heart disease	1.9	0.0	0.0
None	23.1	6.5	46.2

$P \geq 0.05$

Table 15: Correlation between QoL and length of dialysis (years)

Length of dialysis (years)	QoL
	Mean±standard deviation
1<2	56.2±19.05
2<3	43.7±20.01
>3	50.3±20.98

$P \geq 0.05$

DISCUSSION

The objective of the present study was to assess the nutritional status and QoL of hemodialysis patients at Omdurman Military Hospital, the study included 96 patients. The result showed that almost two-third of patients were male (61.5%), 45.8% of them in the middle age group of 40–59 years old, most of the patients had low level of education, slightly above one-third of the sample (37.5%) had secondary level of education, 22.9% had primary education, 19.8% had university/postgraduates studies, 14.6% were illiterate, and 5.2% had khalwa; a factor that may reduce the benefit of nutrition advice given all the time by nutritionist. Low educational level among the patients with kidney failure was also reported in Sudan by Abdullah and Mohammed^[4,11] and in Saudi Arabia by Alharbi.^[12] As stated in the present study, 42.7% were unemployed and 16.7% of the females were registered as housewives. Unemployment in most cases means no monthly income; reasons were the nature of the disease and routine weekly dialysis sessions, unemployment, and low level of education; all these causes contributed to increase the low socioeconomic status of people in Sudan.

Almost half of the patients (49%) were on hemodialysis for >3 years which make them prone to suffer from complications, similar result stated by Al-Saedy and Al-Kahichy^[13] that long period of hemodialysis was prone patients to many complications.

Table 16: Correlation between QoL and BMI status

BMI status	QoL
	Mean±standard deviation
Underweight	49.3±20.36
Normal	51.0±20.51
Overweight	55.5±21.15
Obese	65.8±24.49

$P \geq 0.05$

Table 17: Correlation between number of meals taken by the patients with role function and validity

Number of meals taken by patients	RF	VT
	Mean±standard deviation	Mean±standard deviation
1 meal	17.5±24.37	38.8±9.27
2 meals	47.37±27.13	51.64±9.49
>2 meals	56.8±29.98	56.3±13.48
<i>P value+</i>	0.003	0.019

RF: Role functioning, VT: Validity

The main comorbid diseases among the patients in the present study were hypertension (63.5%), the highest percentage (88.5%) of the patients had two sessions of hemodialysis per week, which means inadequate dialysis leads to more waste which causes imbalance biochemical result and this effect on the patients nutritional status, decrease appetite, and, therefore, the intake of food.

The result demonstrated despite that 55.2% of the patients consumed >2 meals/day their 24 h recall showed that, all the patients had inadequate protein intake and inadequate energy intake, this is in line with a study done in Saudi Arabia by Abu-Almakarem^[14] who found that 3 days dietary record showed that most of the patients failed to attain the recommended energy and protein intake Elhafiz.^[15] showed that low protein and energy intake were associated with low nutritional status among patients with CKD under dialysis.

The majority of patients in the present study had their food with their family (80.2%), this indicates that the patients were not following the advice of the dietitians which affected the adequacy of dialysis and biochemical results and, therefore, their nutrition status and QoL level.

The mean of weight, height, and BMI of the patients was 60.09 ± 15.7 (kg), 1.74 ± 9 (m), and 19.76 ± 4.72 (m²), respectively. As for underweight, the result revealed that 42.7% were underweight which agreed by result stated by Alharbi and Fouque *et al.*^[12,16] who reported, protein-energy wasting was presented in 20–50% of the dialysis population. When a patient's with chronic kidney disease has progressed to where the kidneys have minimal to no function at all, this means the kidneys work at one-tenth their normal function,

so this affects the patient's body ability to filter wastes and maintains calcium and potassium balance, the body may not be able to digest foods properly, this can result in weight loss and inability to fully absorb nutrients from food.

In the present study, biochemical analyses revealed imbalance results, as may be this due to many reason such as imbalance or inadequate food intake and inadequate dialysis, 89.6% of the patients suffered from anemia, and 10.4% were at a normal Hb level, as Rocco *et al.*^[17] reported that CKD patients with anemia (Hb levels <11 g/dL) had lower QoL, scores which increase cardiovascular risk and may lead to death.

The result also showed low level of overall QoL (51.1%). Regarding (QoL) components, physical health and mental health dimensions were 48.8% and 52.6%, respectively, this result similar to the result reported by Tel.^[18] The result revealed that, no significant differences was found in the mean values of quality of life with BMI classification, length of dialysis and chronic disease ($P \geq 0.05$). This contradicted with result conducted by Khan *et al.*^[19] who stated that, in hemodialysis patients in general, comorbidity and BMI were found to be associated with mortality as well as QoL.

Significant differences were detected in the mean values of RF with a number of meals taken by the patients ($P = 0.003$) and also validity with the number of meals ($P = 0.019$). QoL decreased in all stages of kidney disease, a reduction in physical functioning, was observed progressively in the different stages of kidney disease.

CONCLUSIONS

In the present study, the main findings were as follows:

- Almost half of the patients were on hemodialysis for >3 years; all of them had inadequate dialysis. Most of the patients suffered from hypertension.
- Several inadequacies in food intake were found in this study, indicating that patients did not maintain adequate nutrition, as recommended for their underlying disease, and all of them consumed low energy and quality protein.
- High prevalence of underweight was found, and majority of patients had low level of QoL.

RECOMMENDATIONS

The health professionals responsible for the care provided to this population should ideally be familiar with and trained in the application of the QoL assessment tools, which may be valuable in assistance of these patients, even in the earlier stages of disease, and allow timely health-care interventions in the course of the disease.

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