ISSN- O: 2458 - 868X, ISSN–P: 2458 – 8687
National Library of Medicine - ID: 101731606

International Journal of Medical Science and Innovative Research (IJMSIR)
IJMSIR : A Medical Publication Hub
Available Online at: www.ijmsir.com
Volume – 7, Issue – 5, October – 2022 , Page No. : 12 – 17

Assessment of Nutritional Status of Patients Undergoing Haemodialysis

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Citation this Article: Yogeendra Prabhu, Vasanth Malagi, "Assessment of Nutritional Status of Patients Undergoing Haemodialysis", IJMSIR- October - 2022, Vol – 7, Issue - 5, P. No. 12 – 17.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Chronic Kidney Disease (CKD) is highly prevalent, irreversible, progressive and associated with higher risk of cardiovascular diseases. Patients with this pathology remains asymptomatic most of the time, presenting the complications typical of renal dysfunction only in more advance stages. Its treatment can be conservative (patient without indication for dialysis, usually those with glomerular filtration rate above 15ml/min) or renal replacement therapy (haemodialysis, peritoneal dialysis and kidney transplantation). Haemodialysis patients are commonly depleted of protein and energy stores in their body. Protein energy malnutrition frequently appears in haemodialysis patients and it has been established as risk factors for morbidity and mortality. Therefore, assessment of nutritional status and nutritional management play a key role in improving the nutritional status of patients undergoing haemodialysis.

Objective: To assess the nutritional status of patients undergoing haemodialysis.

Materials and Methods: The study used a non-experimental descriptive research design. A total of 180 patients undergoing haemodialysis at a tertiary care hospital, Bangalore were selected by convenience sampling technique. Socio-demographic profile was used to collect the information about socio-demographic variables, and Modified Quantitative Subjective Global Assessment (MQSGA) tool was used to assess the nutritional status of the patient's undergoing haemodialysis.

Results: The collected data were analysed according to the objectives of the study. The results of the revealed that majority of the patients (67.2%) were having mild to moderate level of malnutrition and (5.6%) of the patients were having severe malnutrition. The nutritional status mean score was 13.59 ± 4.19. There was a statistically significant relationship found between anthropometric measurements such as Body Mass Index (BMI), Mid Arm Circumference (MAC) and Mid arm muscle circumference (MAMC) with nutritional status. The study also found statistically significant association between nutritional status and BMI ($\chi 2$=22.47, P= 0.004).

Conclusion: Present study revealed mild to moderate level of malnutrition in majority of the patient's undergoing haemodialysis.

Keywords: Chronic Kidney Disease, Nutritional Status, MQSGA, Haemodialysis

Introduction

Chronic kidney disease (CKD) is currently a public health problem. [1] More than 60 million worldwide people lose their lives annually due to the risk of kidney failure. [2] CKD is a slow, progressive and irreversible loss of kidney function. [1] Because this loss is slow and progressive, it results in an adaptive process in which the patient remains asymptomatic for some time. [3] When the kidney fails to perform most of its function, the clinical state is labelled End-stage renal disease (ESRD) and dialysis or transplantation is required to sustain life. Haemodialysis (HD) is the most common renal treatment today. [4]

Good nutritional status is a well-known marker of well-being in patients with CKD. Protein Energy Malnutrition (PEM) develops during the course of CKD and is associated with adverse outcomes. [5] 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. [5]

Nutritional status may be assessed by measuring anthropometric variables and using several methods. These methods include dual-energy X-ray absorptiometry, bioelectric impedance analysis and total body protein. However, these methods are expensive, cumbersome, rarely available and impractical for routine use. [6]

Several other methods are also used to evaluate the nutritional status of haemodialysis patients. Among these nutritional assessment tools, the widely used are Subjective Global Assessment (SGA), Modified Quantitative Subjective Global Assessment (MQSGA) and Malnutrition Score (MS). SGA was developed by Detsky et.al. MQSGA was developed by Kamyar Kalantar-Zadeh et al. in the year 1999. [6]

Materials and methods

The study used a quantitative descriptive approach with non-experimental descriptive research design. CKD patients who were on haemodialysis for more than six months were selected as population for this study. A total 180 patients undergoing haemodialysis were selected as samples for the study by using convenience sampling technique.

Development of the tool

After extensive review of literature and discussion with subject expert's socio-demographic profile was developed to collect the information on socio-demographic variables (age, gender, religion, educational status, occupation, marital status, type of family, area of residence, family income, type of diet, duration of haemodialysis).

Nutritional assessment of the patient's undergoing haemodialysis was assessed by using Modified Quantitative Subjective Global Assessment (MQSGA-1999) scale. [6] It had seven components: Weight change in the past 6 months, dietary intake, gastro-intestinal symptoms, functional capacity, co-morbidity, decreased fat stores or loss of subcutaneous fat and signs of muscle wasting. Each component was given a score from 1 (normal) to 5 (very severe). Sum of all the components ranged from 7 (normal nutritional status) to 35 (severe malnutrition). Subjects were categorized into three groups: normal (score of 7-10), mild to moderate malnutrition (score of 11-20), and severe malnutrition (score of 21-35). Lower score denotes a normal

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nutritional status. A higher score considered to be an indicator of the presence of malnutrition.

Data collection procedure

Data was collected in tertiary hospital at Bangalore after obtaining formal permission from the concerned authorities. Patients who met the inclusion criteria were recruited for the study by using convenience sampling technique. 180 patients were given detailed information about the study and informed consent was obtained. Sociodemographic information was obtained from the patients. The next step was assessment of nutritional status of haemodialysis patients with MQSGA tool. The MQSGA consisted of two major categories: (I) Patient related medical history and (II) Physical examination.

Medical history of patient includes five components: Weight Change in the past six months, Dietary Intake, Gastrointestinal Symptoms, Functional Capacity and Co - morbidity. For weight changes, the patient weight loss from the preceding six months is recorded along with the current weight. To obtain the dietary intake of the patient, the patient was asked to recall all food and beverages consumed during the previous 2 weeks. Gastrointestinal symptoms such as nausea, vomiting, diarrhoea and severe anorexia were recorded from the patient's self-report. Patients were asked to describe about functional capacity such as difficulty in ambulation and activity. Lastly co-morbid illness related to nutritional status and the duration of it was obtained from the patients.

The second major category of MQSGA is physical examination. Physical examination was performed 10 minutes after the termination of the dialysis session. The physical examination consisted of two components: decreased fat stores or loss of subcutaneous fat and signs of muscle wasting. The patients were assessed for decreased fat stores or loss of subcutaneous fat at the area below eyes, triceps, biceps and chest. The signs of muscle wasting were obtained by examining at seven sites; temple, clavicle, scapula, ribs, quadriceps, knee and interosseous.

Weight and height measurements were measured by following recommended anthropometric procedures (WHO 1995). BMI was calculated as the ratio between end dialysis body weight in kg and the square of height in meters. TSF (Triceps skin fold) and BSF (Biceps Skin Fold) were measured with conventional skin fold calliper. MAC was measured using a measuring tape on the non-access arm of each subject. MAMC was derived according to the following formula: MAMC=MAC-(3.1415 X TSF).

Approximately 2-3 subjects were assessed per day. Assessment of each subject was lasted for about 30 minutes. The collected data was coded and entered in the master coding sheet.

Results

The collected data was analysed according to objectives of the study. SPSS software (Version 20) was used for the data analysis. The data analysis was done by using descriptive and inferential statistics. Frequency and percentage distribution were computed to describe the sociodemographic variables of the subjects. It is observed that (67.8%) of patients were male (32.2%) patients were female. With regards to the age (36.1%) patients belong to the age group of 61 years and above and (93.9%) of the patients belong to Hindu religion. Majority of patients (87.2%) were married and (93.9%) patients were belonging to the nuclear family. More than half of the patients (87.8%) were living in urban areas. It was also observed that (45.6%) of the patients were having annual family income of more than 2 lakhs. Majority of the patients (62.2%) were having secondary education and (60%) of the patients were working in private sector. With regards to the diet (58.9%) of the patients were non-

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vegetarians. Most of the patients (83%) were on dialysis for more than three years.

Height and weight of the patients were used to compute the BMI, (32%) patients were having normal BMI and (18%) patients were under weight. Majority of the patients BSF was more than 5mm and TSF was more than 7 mm. 51% of the patients had MAMC between 26-28 cm and (96.7%) patients were having MAC between 15-35cm.

The mean nutritional score in patients undergoing haemodialysis was 13.59 ± 4.19. Majority of the subjects (67.2%) were having mild to moderate malnutrition, whereas (5.6%) subjects were having severe malnutrition (Table 1).

Table 1: Nutritional status of patients undergoing haemodialysis. n=180

Nutritional Status	Score range	f	%	Mean	SD
Normal nutrition	7-10	49	27.2	13.59	4.19
Mild to moderate malnutrition	11-20	121	67.2		
Severe malnutrition	21-35	10	5.6		

To assess the strength of relationship between anthropometric measurements and nutritional status of the patients undergoing haemodialysis Pearson Correlation Coefficient (r) was used. It was found that anthropometric variables BMI (r=-0.234**), MAC (r=-0.334**) and MAMC (r=-0.312**) are negatively correlated with nutritional status and statistically significant at the 0.01 level (Table 2).

Table 2: Correlation between Anthropometric measurements and Nutritional status. n =180

Variables	r	P-value
BMI	-0.234**	0.002
BSF	-0.097	0.194
TSF	-0.024	0.750
MAC	-0.334**	0.000
MAMC	-0.312**	0.000

**Correlation is significant at the 0.01 level.

Table-3: Comparison of demographic variables, anthropometric measurements with nutritional status of patients undergoing haemodialysis. n =180

Variables	Normal Nutrition (N = 49), MEAN ± SD	Mild to moderate Malnutrition (N = 121), MEAN ± SD	Severe Malnutrition (N = 10), MEAN ± SD	P-value
Age (years)	53.00 ± 13.19	53.01 ± 15.48	60.70 ± 12.72	0.280
Duration of haemodialysis (months)	44.79 ± 23.06	45.91 ± 22.04	36.10 ± 12.29	0.397
Height (cm)	162.77 ± 8.00	159.73 ± 8.18	154.70 ± 12.97	0.012*

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Weight(kg)	64.28 ± 13.96	59.03 ± 13.37	43.12 ± 5.39	0.000*
BMI (kg/m^2)	24.32 ± 5.14	23.12 ± 4.60	18.09 ± 1.80	0.001*
BSF (mm)	5.56 ± 1.64	5.45 ± 1.91	4.70 ± 1.22	0.390
TSF (mm)	7.68 ± 1.64	7.66 ± 1.92	7.48 ± 1.69	0.949
MAC (cm)	25.54 ± 4.57	23.50 ± 4.27	17.99 ± 2.41	0.000*
MAMC (cm)	23.74 ± 4.17	21.68 ± 4.09	15.78 ± 2.20	0.000*

ANOVA was used in order to find out the variation in level of nutritional status with selected demographic and anthropometric measurements of patients undergoing haemodialysis. The difference between the means of levels of nutritional status with height, weight, BMI, MAC and MAMC was found to be statistically significance at $P < 0.05$. But the demographic variables age, duration of haemodialysis and anthropometric measurements BSF and TSF were not statistically significant ($P<0.05$) with level of nutritional status. (Table 3).

Chi-Square test was used to find the association of nutritional status with sociodemographic variables and anthropometric measurements. It was revealed that there is significant association between level of nutritional status with BMI ($\chi 2=22.47$, P= 0.004). However, there was no association found between nutritional status and sociodemographic variables and other anthropometric measurements.

Discussion

One of the common problems seen in patients with chronic kidney disease undergoing haemodialysis is malnutrition. This problem increases the risk of morbidity and mortality among CKD patients.

Present study revealed that 67.2% patients undergoing haemodialysis had mild to moderate malnutrition, whereas 5.6% of the patients severely malnourished (mean:13.59±4.19). The present study findings supported by the studies conducted at Tanzania and Nepal on nutritional status of undergoing haemodialysis revealed mild to moderate level of malnutrition. [7,9]

The present study revealed there is difference between the means of levels of nutritional status with Height (P= 0.012*), weight (P=0.000*), BMI (P=0.001*), MAC (P=0.000*), and MAMC (P=0.000*) were found to be statistically significant at $P < 0.05$. Several studies results supported the present study findings. [7,9]

The present study also revealed that assessed anthropometric measurements such as BMI (r= -0.234**), MAC (r= -0.334**), and MAMC (r= -0.312**) were negatively correlated with nutritional status and were statistically significant. Several studies demonstrated similar results suggesting correlation between anthropometric measurements and nutritional status. [6,7,9]

The present study revealed that there is a significant association between level of nutritional status with BMI. However, there is no association found between level of nutritional status and other variables. The study findings contradicted by study conducted by Ali Omari and others on assessment of nutritional status in maintenance haemodialysis patients revealed significant association between nutritional status and duration of haemodialysis. [10]

Conclusion

Study concluded that there is mild to moderate level of malnutrition in patients undergoing haemodialysis. There is a relationship between anthropometric measurements

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and nutritional status of the patient undergoing haemodialysis. In order to prevent and treat malnutrition in patients undergoing dialysis it is important to assess the nutritional status and to identify patients at risk.

Acknowledgment

The authors wish to express and acknowledge gratitude towards Rajiv Gandhi University of Health Sciences, Bengaluru, Karnataka, India, for funding this research study. The authors also wish to acknowledge their gratitude towards Ramaiah Memorial Hospital, Bengaluru, Karnataka, India, where the study was carried out.

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