Original Research Article

Evaluation of Nutritional Status of Haemodialysis Patients Using Malnutrition Inflammation Score

Abstract

Background: One of the common problems of maintenance dialysis patients is malnutrition especially Protein-Energy Malnutrition (PEM) and several studies have revealed that PEM is associated with increased morbidity, mortality, and impaired quality of life. The aim of this work was to evaluate the nutritional status in hemodialysis patients using malnutrition inflammation score (MIS).

Methods: This cross-sectional study was carried out on 100 patients on regular hemodialysis. Patients were classified in to two groups according to MIS status; group A which were well nourished and group B which were malnourished. Patients included were subjected to; through history taking, laboratory investigations [CBC, Blood glucose level, Kidney function, Livre function tests, Lipid profile (cholesterol- triglycerides-HDL-LDL), Sodium-Potassium-phosphorus, C-reactive protein, ESR, Iron study (serum iron-serum ferritin-total iron binding capacity)], malnutrition-inflammation questionnaire and malnutrition-inflammation score.

Results: There was a statistically significant difference regarding blood hemoglobin, TIBC, creatinine, sodium, HDL, ESR, and CRP between two groups as they all decreased in group B more than group A, except CRP and ESR, creatinine and HDL they increased in group B more than group A (P value <0.05).

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

Keywords: Nutritional Status, Haemodialysis, Malnutrition, Inflammation Score.

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Introduction:

Chronic kidney disease (CkD) is a major public health problem, and its incidence and prevalence are increasing worldwide(1).

CKD is defined as 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 haemodialysis (HD)(2).

One of the common problems of maintenance dialysis patients is malnutrition espicially Protein-Energy Malnutrition (PEM) and several studies have revealed that PEM is associated with increased morbidity, mortality, and impaired quality of life(3), and reports have suggested a strong association between nutrition and clinical outcome in hemodialysis patients(4).

Various factors involved in the aetiology of PEM may include poor food intake (due to anorexia, nausea and vomiting due to uraemia), endocrine disorders, metabolic acidosis and increased energy expenditure(5).

Moreover, restricted diet, loss of amino acids during dialysis, infection, gastrointestinal disorders, and the use of certain drugs may lead to PEM(6).

Therefore, in patients with chronic kidney disease and ESRD, a regular evaluation of nutritional status is required during both pre-dialysis and dialysis stages in order to detect PEM and its causes as early as possible, to treat and to prevent its worsening and its complications(7).

To assess the nutritional status of dialysis patients in various ways, including anthropometric measurements (body wight and hight, body mass index), biochemical parameters, performance evaluation and a comprehensive evaluation of diet or the Subjective Global Assessment method (SGA) is used(8).

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(SGA) was originally developed to identify poor nutrition status in subjects undergoing gastrointestinal surgery, but has since been adapted for use in patients with CKD and ESRD(9).

It has been used to quantify the prevalence of malnutrition in hemodialysis patients(10).

Which will be discussed later.This study aims to evaluate the nutritional status in haemodialysis patients using malnutrition inflammation score (MIS).

Patients and Methods:

This Cross sectional study conducted in nephrology unit –internal medicine department at Tanta University hospital and El mahalla General hospital.

This study will be carried out on 100 patients who are on regular dialysis.

Inclusion criteria:

- All patients will be regularly treated for 4 h, thrice weekly.
- HD sessions using bicarbonate dialysate.
- At least 8 weeks of initiation of dialysis in the past.
- Able to interview and communicate.

Exclusion criteria:

Refuse of the procedure patients.

History of severe emotional disorders such as schizophrenia.

Every case will be subjected to the following:

1. History taking.
2. Complete clinical examination.
3. Lab. Investigations including :

- Complete blood culture.
- Blood glucose level(fasting-postprandial).
- Kidney function tests (urea- creatinine).

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All patients wereon regular treatment :|9H|Comment

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Pateints who are able to be subjected to an interview and can communicate :|13H|Comment

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(patients) :|15H|Comment

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- Livre function tests (direct bilirubin-indirect bilirubin-total bilirubin-SGOT-SGPT).
- Lipid profile(cholestrol- triglycerids-HDL-LDL).
- Sodium-Pottasim- phosphorus.
- C-reactive Protien(CRP)
- Erythrocyte Sedementation Rate(ESR) .
- Iron study (serum iron-serum ferittin-total iron binding capcity).

4. Malnutrition-inflammation questionnaire:

- The questionnaire include: The patient's name, age, sex, ethnicity, occupation.
- The etiology of the disease: History of dialysis time (referring to the patient's medical records). Weight (dry wight that will be measured after session) and height (anthropometricmeasurements).(11)

5. Demografic data that its reliability and validity had been examined previously in many studies, was completed)(12.(

Malnutrition-inflammation score. Inflammation score has 10 questions including subjective global assessment (SGA) 7 questions and 3 other items that is body mass index, serum albumin and iron saturation capacity (TIBC) .

1. Weight loss during the previous 6 months.
2. Symptoms of gastro-intestinal tract, such as anorexia, nausea, vomiting, diarrhea.
3. Food intake.
4. Functional capacity (related to power failure).
5. The history of dialysis.
6. Loss of subcutaneous fat in the mid arm muscle area and arm muscle area of the lateral line of the body.
7. Loss of subcutaneous fat of the muscles in the shoulder and quadriceps muscle of the thigh.

spelling :|17H|Comment

Potassium :|18H|Comment

Full meaning? :|19H|Comment

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8. Body mass index in four state (≥ 20Kg/m2) (18-19.9 Kg/m2) (16-17.99Kg/m2) (<16Kg/m2).

9. Serum albumin, in the four-state (≥4 g/dl) (3.9-3.5 g/dl) (3.4-3 g/dl) (<3 g/dl).

10. TIBC in four state (≥ 250 g/dl) (200-249 g/dl) (199-150 g/dl) (<150g/dl) .

So the 10 questions MIS score, each with four status from 0 to 4 Score 0 (normal) to 3 (severe). (12)

Statistical analysis

Statistical presentation and analysis of the present study was conducted, using the mean, standard deviation and chi-square test by SPSS V.22.

-1Mean value : the sum of all observations divided by the number of observation :

=

Where = sum & n = number of observations .

-2Standard Deviation [SD] :

It measures the degree of scatter of individual varieties around their mean :

-3Standard student "t test", test of significance of the difference between two means:

t =

The calculated "t" was compared with tabulated one at different levels of significance at the degree of freedom (DF):

DF = (D + n2) -2 Where:

= The mean value of group L

= The mean value of group II.

SD1 = The standard deviation of group I.

SD2 = The standard deviation of group II.

n1 = The number of observations of group L

n2 = The number of observations of group II.

-4Chi-square test of significance was used in order to compare proportions between qualitative parameters.

Chi-square test:

For comparison between two groups as regards qualitative data.

X2 =

Where:

= Summation .

O = Observed value .

E = Expected value =

All these informations :|**21H|Comment** are not needed here. May be included in appendix (if available)

Results:

This study conducted on 100 patient aged from (18-70) on regular hemodialysis during the period from between October 2019 and March 2020 who were divided by using malnutrition inflammation score for nutritional assessment in to two groups group A and group B.

Group A which were well nourished

Group B which were malnourished

We compered between two groups by using demographic and anthropometric measurement data (age, sex, weight, height, body mass index).

Laboratory data (urea, creatinine, HB%, CRP, serum albumin, TIBC, serum ferretin, serum sodium, serum potassium, serum phosphate, ESR, direct bilirubin, indirect bilirubin, SGOT, SGPT, cholesterol, triglycerides, LDL, HDL).

This study was :|22H|Comment conducted

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Table (1): Comparison between group A and group B according to age

		Range			Mean	±	S. D	t. test	p. value
Age	Group A	23	–	70	58.77	±	8.67	0.937	0.335
	Group B	23	–	72	56.79	±	9.66		

Table (1) showed that; there was no statistically significant difference between two groups as regard age with p value 0.335

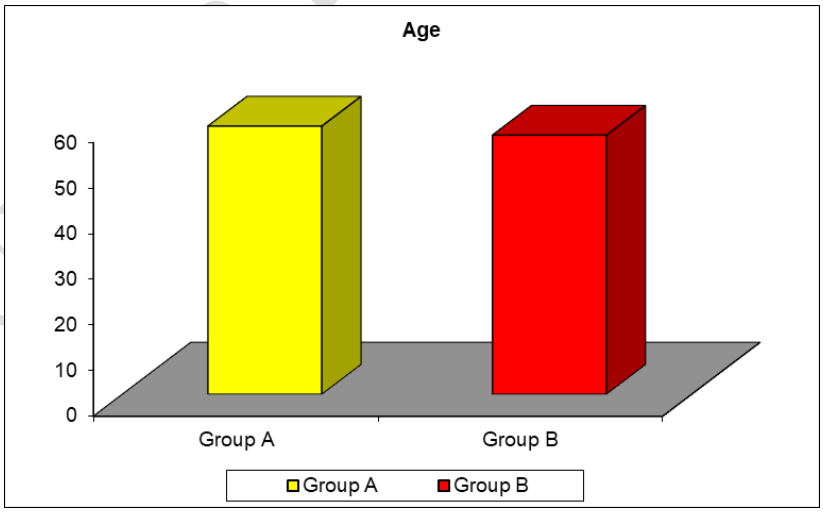

Figure (1): Comparison between group A and group B as regard age

Table (2): Comparison between group A and group B as regard sex

Sex			Group A	Group B	Total
Male		**N**	17	49	66
		%	56.7%	70.0%	66.0%
Female		**N**	13	21	34
		%	43.3%	30.0%	34.0%
Total		**N**	30	70	100
		%	100.0%	100.0%	100.0%
Chi-square	**X^2**	**1.664**			
	P-value	**0.197**			

Table 2 showed that; there was no statistically significant difference between two groups as regard to gender with p value 0.197

Table (3): Comparison between group A and group B as regard to weight,

		Range			Mean	±	S. D	t. test	p. value
Dry Weight	Group A	67	–	104	82.92	±	10.12	2.111	0.149
	Group B	46.5	–	142.5	78.20	±	16.46		

Table 3 showed that; there was no statistically significant difference between two groups as regard to weight with p value 0.149

Table (4): Comparison between group A and group B as regard to height,

		Range			Mean	±	S. D	t. test	p. value
Height	Group A	1.5	–	1.8	1.65	±	0.10	1.872	0.174
	Group B	1.5	–	1.9	1.68	±	0.11		

Table 4 showed that; there was no statistically significant difference between two groups as regard to weight with p value 0.174

Table (5): Comparison between group A and group B as regard to body mass index

		Range			Mean	±	S. D	t. test	p. value
BMI	Group A	23.15	–	46.22	30.62	±	4.84	4.750	0.032*
	Group B	17.02	–	43.98	27.79	±	6.37		

Table 5 showed that; there was statistically significant difference between two groups as regard to weight with p value 0.032

Table (6): Comparison between group A and group B as regard to S.ferittin

		Range			Mean	±	S. D	t. test	p. value
Ferittin	Group A	70	–	1510	773.37	±	410.42	0.420	0.519
	Group B	19	–	3235	687.02	±	677.62		

Table 6 showed that; there was no statistically significant difference between two groups as regard to ferittin with p value 0.519

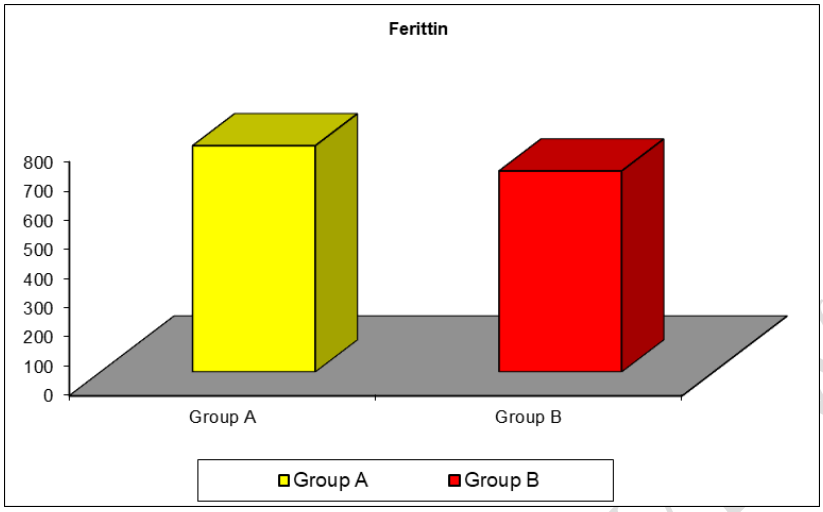

Figure (2): Comparison between group A and group B as regard to S. .ferittin

Table (7): Comparison between group A and group B as regard to K

		Range			Mean	±	S. D	t. test	p. value
K	Group A	3.7	–	6.6	5.00	±	0.93	0.074	0.787
	Group B	3.1	–	8	4.94	±	0.98		

Table 7 showed that; there was no statistically significant difference between two groups as regard to K with p value 0.787

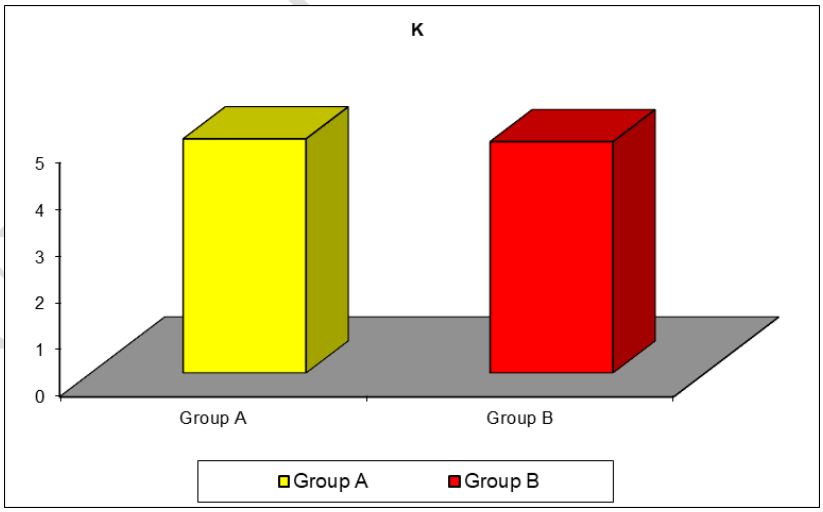

Figure (3): Comparison between group A and group B as regard to K

Table (8): Comparison between group A and group B as regard to PO4

		Range			Mean	±	S. D	t. test	p. value
PO4	Group A	3.3	–	6.9	4.78	±	1.04	0.154	0.695
	Group B	2.6	–	7.8	4.70	±	0.96		

Table 8 showed that; there was no statistically significant difference between two groups as regard to PO4 with p value 0.695

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Table (9): Comparison between group A and group B as regard to CRP

		Range			Mean	±	S. D	t. test	p. value
CRP	Group A	3	–	48	15.03	±	10.77	5.761	0.018*
	Group B	3	–	64	22.43	±	15.31		

Table 9 showed that; there was statistically significant difference between two groups as regard to CRP with p value 0.018

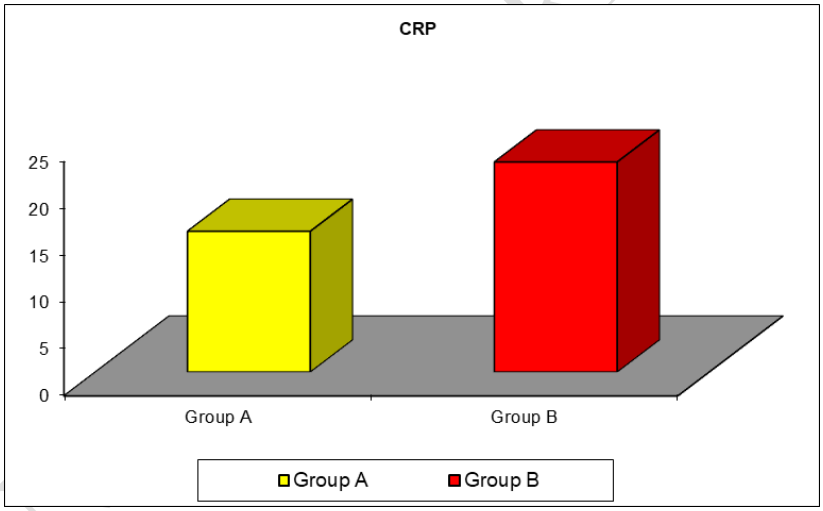

Figure (4): Comparison between group A and group B as regard to CRP

Table (10): Comparison between group A and group B as regard to ESR

		Range			Mean	±	S. D	t. test	p. value
ESR 1	Group A	5	–	122	33.27	±	26.30	5.308	0.023*
	Group B	5	–	135	48.13	±	30.82		
ESR 2	Group A	10	–	135	59.23	±	33.04	6.985	0.010*
	Group B	10	–	140	78.61	±	33.84		

Table 10 showed that; there was statistically significant difference between two groups as regard to ESR 1 with p value 0.023 and ESR 2 with p value 0.010

Table (11): Comparison between group A and group B as regard to Cholesterol

		Range			Mean	±	S. D	t. test	p. value
Cholesterol	Group A	99	–	200	156.27	±	28.58	1.195	0.277
	Group B	95	–	220	149.53	±	28.10		

Table 11 showed that; there was no statistically significant difference between two groups as regard to Cholesterol with p value 0.277

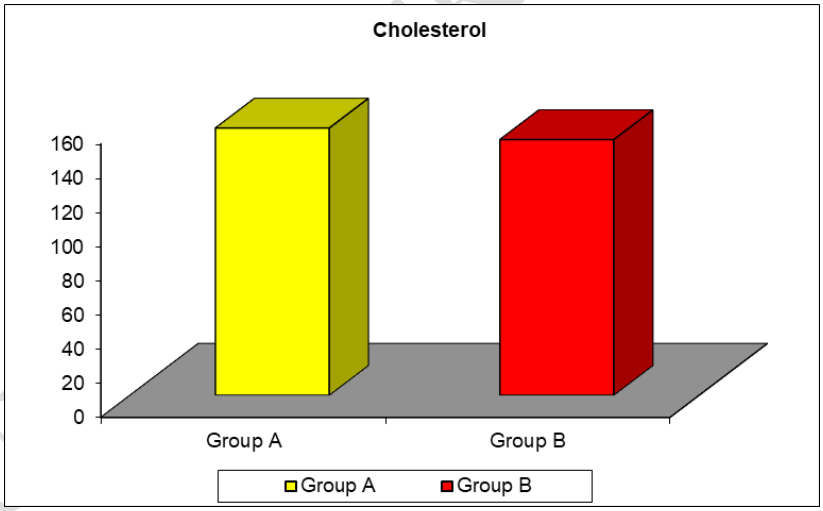

Figure (5): Comparison between group A and group B as regard to Cholesterol

Table (12): Comparison between group A and group B as regard to livre function (SGOT,SGPT,DB,IDB)

		Range			Mean	±	S. D	t. test	p. value
SGOT	Group A	7	–	90	20.73	±	16.50	0.034	0.854
	Group B	6	–	93	20.09	±	15.86		
SGPT	Group A	11	–	179	26.73	±	32.34	0.028	0.868
	Group B	11	–	181	25.53	±	33.38		
Direct bilirubin	Group A	0.1	–	0.2	0.15	±	0.05	0.918	0.340
	Group B	0.1	–	0.2	0.14	±	0.05		
Indirect bilirubin	Group A	0.8	–	0.9	0.85	±	0.05	0.047	0.829
	Group B	0.8	–	0.9	0.86	±	0.05		

Table 12 showed that; there was no statistically significant difference between two groups as regard to SGOT with p value 0.854; SGPT with p value 0.868 ; DB with p value 0.340 and IDB with p value 0.829

Table (13): Comparison between group A and group B as regard to urea

		Range			Mean	±	S. D	t. test	p. value
Urea	Group A	15	–	63	36.60	±	11.79	1.040	0.310
	Group B	15	–	100	40.51	±	19.52		

Table 13 showed that; there was no statistically significant difference between two groups as regard to urea with p value 0.310

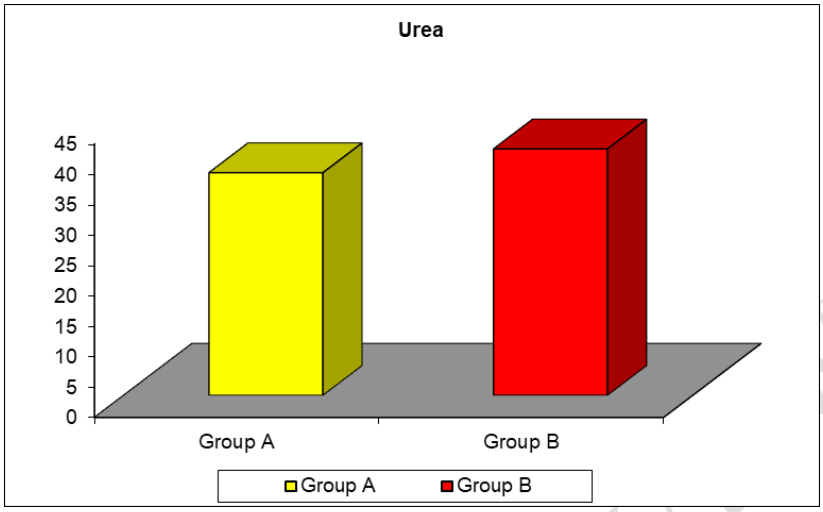

Figure (6): Comparison between group A and group B as regard to urea

Table (14): Comparison between group A and group B as regard to Creatinin

		Range			Mean	±	S. D	t. test	p. value
Creatinin	Group A	1	–	4.9	2.33	±	1.08	7.388	0.008*
	Group B	1.4	–	7.3	3.07	±	1.31		

Table 14 showed that; there was statistically significant difference between two groups as regard to Creatinin with p value 0.008

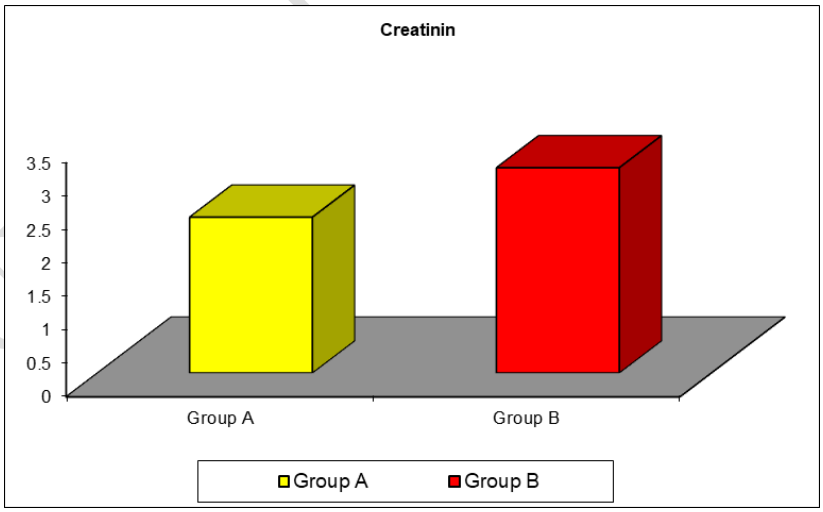

Figure (7): Comparison between group A and group B as regard to Creatinin

Table (15): Comparison between group A and group B as regard to cause of renal failure

Cause			Group A	Group B	Total
HTN		**N**	14	10	24
		%	46.7%	14.3%	24.0%
DM		**N**	15	55	70
		%	50.0%	78.6%	70.0%
Polycystic		**N**	1	3	4
		%	3.3%	4.3%	4.0%
Glomerulonepheritis		**N**	0	2	2
		%	.0%	2.9%	2.0%
Total		**N**	30	70	100
		%	100.0%	100.0%	100.0%
Chi-square	**X^2**		**12.528**		
	P-value		**0.001***		

Table 15 showed that; there was high statistically significant difference between two groups as regard to cause of renal failure with p value 0.001

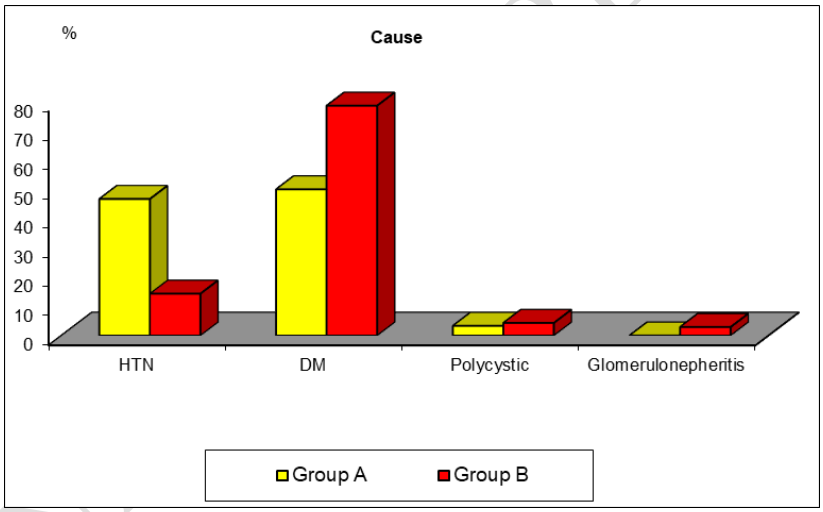

Figure (8): Comparison between group A and group B as regard to cause of renal failure

Table (16): Comparison between group A and group B as regard to GIT symptoms

GIT Symptoms		Group A	Group B	Total
Normal	**N**	27	38	65
	%	90.0%	54.3%	65.0%
Mild	**N**	3	12	15
	%	10.0%	17.1%	15.0%
Moderate	**N**	0	12	12
	%	.0%	17.1%	12.0%
Severe	**N**	0	8	8

		%	.0%	11.4%	8.0%
Total		**N**	30	70	100
		%	100.0%	100.0%	100.0%
Chi-square	**X^2**	**13.407**			
	P-value	**0.004***			

Table 16 showed that; there was high statistically significant difference between two groups as regard to GIT symptoms with p value 0.004

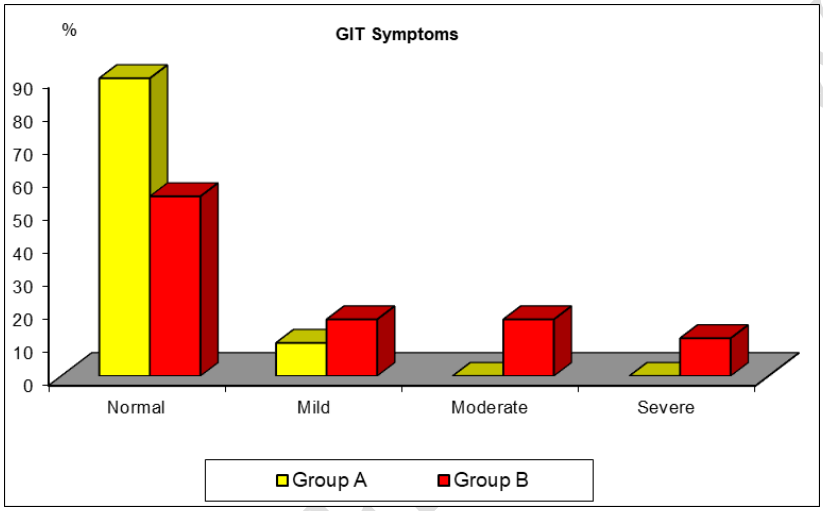

Figure (9): Comparison between group A and group B as regard to GIT symptoms

Table (17): Comparison between group A and group B as regard to subcutaneus fat loss in shoulder region

SCF Loss In Shoulder		Group A	Group B	Total
Normal	**N**	27	43	70
	%	90.0%	61.4%	70.0%
Mild	**N**	3	19	22
	%	10.0%	27.1%	22.0%
Moderate	**N**	0	8	8
	%	.0%	11.4%	8.0%
Total	**N**	30	70	100
	%	100.0%	100.0%	100.0%
Chi-square	**X^2**	**8.683**		
	P-value	**0.013***		

Table 17 showed that; there was statistically significant difference between two groups as regard to subcutaneus fat loss in shoulder region with p value 0.013

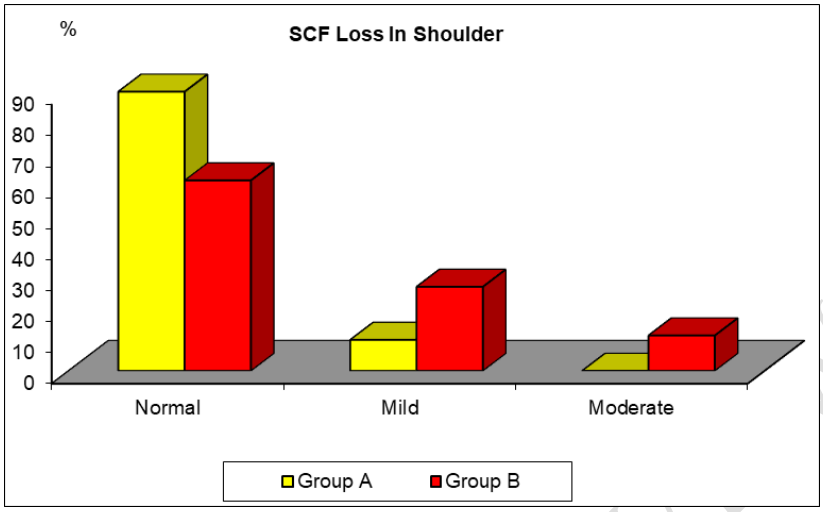

Figure (10): Comparison between group A and group B as regard to subcutaneus fat loss in shoulder region

Discussion

Chronic kidney disease is a major public health problem and its incidence and prevalence are increasing (13).

World-wide, the reported annual incidence of end-stage renal disease (ESRD) ranges between 34 and 200 per million population and there is an even higher number of patients in the earlier stages of chronic kidney disease, facing ad-verse outcomes such as kidney failure, cardiovascular disease and premature death (14).

Malnutrition is common in patients with ESRD. Inadequate dietary intake, which is considered the single most important cause of malnutrition in dialysis patients, is largely attributed to uremia secondary to inadequate dialysis. Low protein and energy intake is frequently observed in maintenance hemodialysis patients (15).

Several studies reported that supplementation of protein and energy improved outcome, such as reduction of mortality and hospitalization in malnourished patients with maintenance hemodialysis (16).

Malnutrition is associated with delayed recovery and an increase in hospitalization, susceptibility to infection, mortality, and morbidity. Chronic diseases are often associated with chronic functional impairment and adversely affect the quality of life (17)

Malnutrition is one of the factors affecting the quality of life. Early intervention in patients with malnutrition increases the quality of life and reduces mortality(18).

The malnutrition-inflammation scale (MIS) score, established by Kalantar-Zadeh et al., is a quantitative score measuring the nutritional status and its severity (18). The MIS was found to be superior to conventional predictors such as serum levels of C-reactive protein (CRP) as well as to other scales used to assess malnutrition among HD patients such as subjective global assessment (19).

This study conducted on 100 patients on regular hemodialysis during the period from between October 2019 and March 2020 who were divided by using malnutrition inflammation score for nutritional assessment in to two groups group A (Well-nourished) and group B (malnourished).

In the current study, the incidence of malnutrition was 70%. This came in accordance with two studies from India. Janardhan et al. reported malnutrition in 91% and Tapiwala et al. in 68% in small cohorts of 66 and 28 HD patients, respectively (20).

These results were similar to the prevalence reported by similar study among HD patients in Egypt (Assuit city) which revealed about 85% malnourished patients (81.6% mild to moderate malnutrition and 3.6% severe malnutrition) (21).

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In another study conducted in Cairo, Egypt, Zaki and his colleagues showed that the prevalence of malnutrition among HD patients (n=100) was 67% (50% were mild to moderate malnourished and 17% were severe malnourished) (22).

This difference can be explained by lower educational level, socioeconomic state and health care facilities in south Egypt area compared to the capital city. However, our results were comparable with findings of other study in Jordan, that reported 61.8% malnutrition rate among 178 patients undergoing HD (23). Another study was done in Saudi Arabia 2018 that revealed 57% of HD patients were malnourished according to SGA (49% were undernourished and 18% were severely malnourished) (24).

These differences in prevalence may be due to environmental diversity and different diet regiments in various regions of the middle east area.

In other studies, moderate incidence of malnutrition was reported in other studies. Todd et al. reported 35% and 25% prevalence in Aboriginal and non-Aboriginal Australian HD patients, who had acceptable parameters of dialysis adequacy, respectively (25). Mazairac et al. in a multicenter study from the Netherlands reported malnutrition prevalence of 23% in large cohort of 560 patients (26).

This difference is probably due to several factors such as different sample size and the differences of adequate dialysis delivery.

Hemodialysis patients commonly have poor dietary habits, particularly with regard to the intake of foods with high concentrations of sugar and fats, and low levels of consumption of cereals, fruits and vegetables, an observation that is consistent with the findings of this study. Shortcomings in the intake of calories, proteins, saturated fats, cholesterol, vitamins and minerals, among other food components, are also found by other researchers (26), as was the case of the current study results.

This findings was in line with a cross-sectional study that conducted on malnutrition prediction using SGA-DMS state that majority of the patient (91%) were mild to moderately malnourished and there were no significant differences between men and women with the malnutrition score because of both men and women had equal tendency towards malnutrition (27)

This discussion did not discuss your results. Please readdress the results of this study. :|31H|Comment

Conclusions:

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

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References:

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