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Assessment of the Nutritional Status and Dietary Intake of Hemodialysis Patients

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Abstract:
Chronic kidney disease (CKD) is a major public health problem worldwide and patients undergoing dialysis suffer from a marked prevalence of malnutrition, which can be defined as a state of excess or deficiency of nutrients, energy, protein, etc., and causes negative effects on body composition and function Objectives: To study the diets followed by dialysis patients, compare daily food intake with their recommended needs, and evaluate the results. Material and methods: Knowing the common diet for dialysis patients for each case of 50 people with kidney failure at the Zarrouk Dialysis Center, whose ages range from 25-80. Number of males (32) Number of females (18). The second part of the study Aims for the amount of calories and protein each person consumes in 24 hours. Result. 62% of patients consumed less than their protein requirement ،according to the haemoglobin index, 54% of them had insufficient haemoglobin levels (<10) 42% of patients had depletion less than 35 and 6% had severe albumin depletion. Conclusion: Patients assessed in this study showed deficiencies in terms of both quantitative and qualitative measures of food intake. Compared to the need of individuals on hemodialysis and guidance for a healthy diet, patients require an appropriate nutritional education and regimen.

Keywords: Hemodialysis, Vegetable, Protein, Nutrition, Carbohydrates.

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تقييم حالة التغذية والمدخول الغذائي لمرضى غسيل الكلى

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الملخص
مرض الكلى المزمن (*CKD*) هو مشكلة صحية عامة رئيسية في جميع أنحاء العالم ويعاني المرضى الذين يخضعون لغسيل الكلى من انتشار ملحوظ لسوء التغذية، والذي يمكن تعريفه على أنه حالة من الإفراط أو النقص في العناصر الغذائية والطاقة والبروتين وما

إلى ذلك، ويسبب آثارًا سلبية على تكوين الجسم ووظيفته. الأهداف: لدراسة الأنظمة الغذائية التي يتبعها مرضى غسيل الكلى، قارن تناول الطعام اليومي باحتياجاتهم الموصي بها، وقم بتقييم النتائج. المواد والطرق: معرفة النظام الغذائي الشائع لمرضى غسيل الكلى لكل حالة من 50 شخصًا يعانون من الفشل الكلوي في مركز غسيل الكلى في زروق، وتتراوح أعمارهم بين 25 و80 عامًا. عدد الذكور (32) عدد الإناث (18). الجزء الثاني من الدراسة يهدف إلى كمية السعرات الحرارية والبروتين التي يستهلكها كل شخص في غضون 24 ساعة. النتيجة: 62٪ من المرضى يستهلكون أقل من احتياجاتهم من البروتين، وفقًا لمؤشر الهيموغلوبين، 54٪ منهم لديهم مستويات غير كافية من الهيموغلوبين (< 10) 42٪ من المرضى يعانون من نضوب أقل من 35 و6٪ يعانون من نضوب شديد في الألبومين. الاستنتاج: أظهر المرضى الذين تم تقييمهم في هذه الدراسة أوجه قصور من حيث المقاييس الكمية والنوعية لتناول الطعام. بالمقارنة مع حاجة الأفراد إلى غسيل الكلى والتوجيه لنظام غذائي صحي، يحتاج المرضى إلى تثقيف ونظام غذائي مناسب.

الكلمات المفتاحية: غسيل الكلى، الخضروات، البروتينات، التغذية، الكربوهيدرات، فشل كلوي.

Introduction

Dialysis is a treatment to filter wastes and water from the blood, allowing people with kidney failure to feel better and continue doing the things they enjoy. In hemodialysis (HD), blood goes through a filter outside the body and the clean blood is returned to the body. HD is usually done at a dialysis center three times a week [1]. Individuals undergoing dialysis have a significant prevalence of malnutrition, which is classified as mild, moderate, and severe [2]. Malnutrition is a general term that indicates a state of nutrition in which a deficiency or excess (or imbalance) of Energy, protein, and different vitamins reasons measurable destructive results on tissue/frame form (frame shape, size, and composition) function, and scientific outcome. The first and most important type is protein-energy wasting (PEW), which is defined as a lack of supply of sufficient energy or protein to meet the body's metabolic demands [3]. Nutritional management is widely recognized as an integral part of the treatment for patients with CKD. Patients undergoing HD are at a high risk of malnutrition which significantly impacts mortality. Therefore, to optimize nutritional status, those patients with end-stage kidney disease HD need to be given appropriate nutritional requirements that are met [4]. Studies described in various countries have indicated that the prevalence of malnutrition in HD patients ranged from 16% to 90%, and among the 90% of malnutrition in HD patients, lack of financial income appears to be the main factor in the involvement of malnutrition. Some studies have indicated that energy and/or protein variation ranges from 51% to 70% in these patients [18]. Patients on maintenance hemodialysis should have a minimum protein intake of 1.1g/kg IBW (Ideal Body Weight) /day [5]. To achieve good dialysis outcomes, dialysis patients need to strictly control their diet to help control the waste products and fluids accumulated between dialysis treatments. Dialysis patients need to have the right amount intake of protein, calories, fluids, vitamins and minerals each day A good diet for a dialysis patient is adequate in protein, adequate in calories, low in potassium, low in sodium, and low in phosphorus, controlled in fluids [6]. Statement problem Assessing the nutritional status and dietary intake of hemodialysis patients is an important aspect of their overall care. It helps healthcare professionals understand the specific nutritional needs and challenges faced by these patients. Several studies have been conducted to evaluate the nutritional status of hemodialysis patients. One study concluded that overall, hemodialysis patients had good nutritional status, but younger patients tended to have low BMI while older patients were more likely to be obese [1]. This highlights the need for individualized nutrition interventions based on age and body composition. Another prevalent issue among adult hemodialysis patients is protein-energy wasting (PEW), which significantly impacts their nutritional status [2]. PEW refers to a state of malnutrition characterized by loss of muscle mass and fat stores, leading to poor outcomes in these patients. Addressing PEW requires tailored nutrition plans that focus on optimizing protein and energy intake. However, it's important to note that achieving good nutrition remains a challenge for dialysis patients in general [3]. Each patient may have unique dietary restrictions or requirements due to comorbidities or treatment protocols. Therefore, individualized and tailored approaches are crucial in managing the nutritional needs of hemodialysis patients. 1. Assessment of malnutrition of dialysis patients and comparison of nutritional parameters of CAPD and hemodialysis patients [2]. 2. Nutritional assessment and its correlation with anthropometric measurements in hemodialysis patients. 3. Physical status: the use of and interpretation of anthropometry, report of a WHO expert Committee [2, 3].

Material and methods

Proper nutrition is important for hemodialysis patients because it can help improve their health and well-being in general, as well as reduce the risk of complications such as cardiovascular disease, bone and anaemia. Comprehensive nutritional evaluation can help identify any deficiencies or abuses in the patient's diet.

Research hypothesis:

The Studied diet may help improve the patient's physical and psychological condition.

Aims

1. Studying the diets followed by hemodialysis patients.
2. Comparing patients' daily food consumption with their recommended needs.
3. Assessment the results.

The importance of research

Nutritional assessment is essential for hemodialysis patients because they are more susceptible to malnutrition and other nutritional deficiencies. Dialysis treatment can lead to the loss of important nutrients and minerals, as well as changes in appetite and metabolism.

Nutritional assessment plays an important role in the care of dialysis patients by helping to improve their nutritional status, prevent complications, and improve their overall quality of life.

Materials and methods

Study Community (Samples):

Then 50 random samples of dialysis patients were selected, their ages ranging from 25 to 80 years, the number of males was 32 and females were 18.

Field of the study (Location):

The study was conducted at the Zarrouk Dialysis Center, Misrata.

Data Collection:

1. Using two types of nutritional intake assessment tools:

i. Food frequency questionnaire (FFQ)

A list of 11 food and beverage groups was designed to obtain information on the frequency and consumption of these foods over a specific period (monthly) to assess their overall diet.

ii. A 24-hour dietary recall

This questionnaire is designed to record all foods and drinks consumed within 24 hours, indicating the size of the quantity consumed for each food (how to weigh portions of each food for patients using standard cups and spoons was explained and described) to calculate the calories and protein consumed for each patient.

2. Personal interview

Each patient was interviewed after obtaining consent to participate in this study. General data and some blood tests were collected, and data for both the FFQ and 24-hour recall were filled out.

1. Through a questionnaire 24 recall hours calories and protein were calculated for all foods consumed by each patient based on standard references for calculating calories and protein [21; 22].
2. Daily intake was compared with the standard requirement for each patient.

Statistical methods used:

1- Frequencies & Percentages: To identify the primary characteristics of the study sample's vocabulary, and determine the responses of its vocabulary to the scale phrases included in the study tool.

Percentages are considered a mathematical expression for comparing numbers of the same type or units of measurement.
2- The mean to find out the extent of the high or low responses of the study sample for each Measurement.
3- Standard Deviation to identify the extent of the deviation of the study sample responses for each degree from its mean.
4- Paired samples T-Test: This test was used to study the significant differences of two independent samples.

Statistical analysis
presentation is made to analyze the data and test the study's standards, by answering the study's questions and interpreting the most prominent results of the questionnaire that were reached through analyzing its paragraphs and identifying the primary data of the respondents. Therefore, statistical treatments were performed for the data collected from the study's questionnaire, as it was used Statistical Package for Social Studies (SPSS) to obtain the results of the study

Results and discussion
It is clear from Table (1) which relates to the distribution of the study sample by gender, which the highest Percentage was for males, which amounted to (64%), followed by the lowest Percentage for females, which amounted to (36%), and Figure (1) also shows this

Table 1: Distribution of the study sample by gender.

Gender	Frequency	Percentage
Male	32	64%
Female	18	36%
Total	50	100%

It is clear from Table (2) which relates to the distribution of the study sample according to activity level, that the lowest Percentage age was for the inactive level and amounted to (12%), then the highest Percentage age was for the light level and amounted to (46%), followed by the middle level Percentage and amounted to (32%), while the lowest Percentage was for the level Active amounted to (10%),

Table 2: Distribution of the study sample according to Activity level.

Activity level	Frequency	Percentage
In active	6	12%
Light	23	46%
Middle	16	32%
Active	5	10%
Total	50	100%

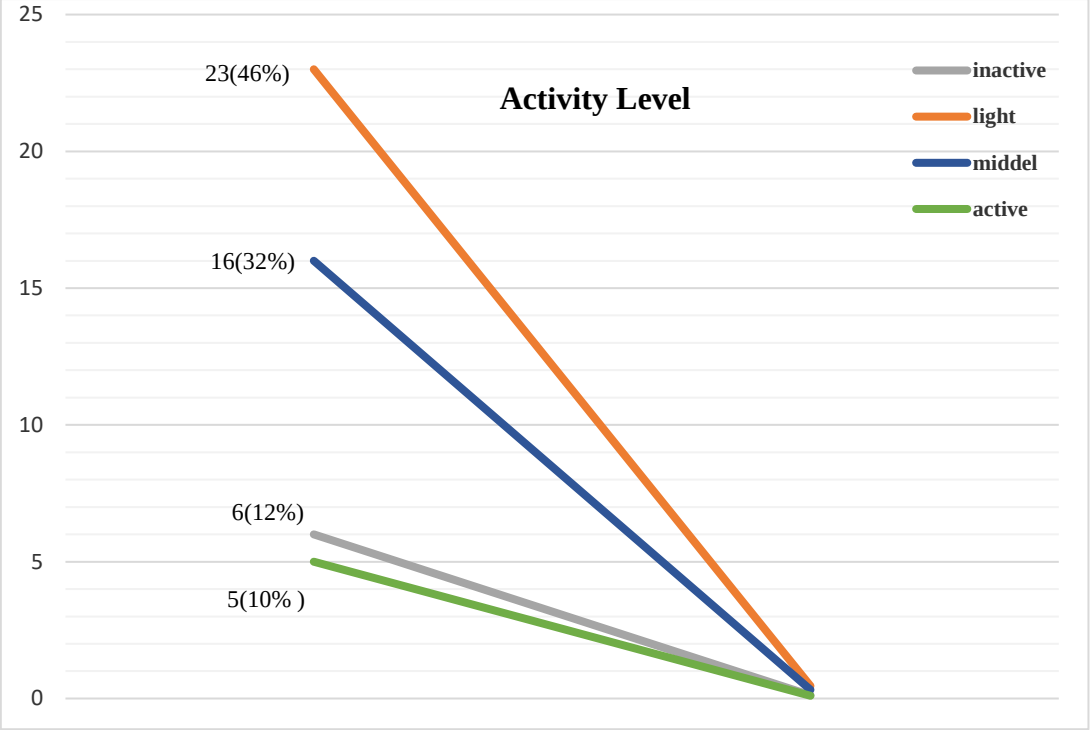

Figure 2: Distribution of the study sample according to activity level.

It is clear from Table (3) which relates to the distribution of the study sample according to financial condition, that the highest Percentage for the financial category was less than 1000, reaching (58%), followed by the lowest for the financial category, which ranged from 1,000 to 4,000, reaching (42)

Table 3: Distribution of the study sample according to financial condition

Financial condition	Frequency	Percentage
Less than 1000	29	58%
From 1000 to 4000	21	42%
Total	50	100%

It is clear from Table (4) which relates to the distribution of the study sample according to smoking, that the lowest Percentage of non-smokers was (16%), followed by the lowest Percentage of smokers, which was (84%),

Table 4: Distribution of the study sample according to smoking.

Smoking	Frequency	Percentage
yes	8	16%
No	42	84%
Total	50	100%

It is clear from Table (5) which relates to the distribution of the study sample according to the amount of water drunk daily, that the highest Percentage of the amount of water drunk daily was for the amount of less than one liter, which amounted to (48%), followed by the Percentage age of drinking that ranged between 1 to 2 liters, which amounted to (46%). Then the lowest Percentage age of the amount of drinking, which ranges between 2-3 liters, was (6%), and Figure (5) also shows this.

Table 5: Distribution of the study sample according to the amount of water drunk daily.

water drunk daily	Frequency	Percentage
Less than a liter	24	48%
1-2 liters	23	46%
liters 3-2	3	6%
Total	50	100%

The study sample consisted of 50 participants, with 64% being male and 36% being female. The majority of participants fell under the light activity level, and most had a financial condition of less than 1000. The majority of participants were non-smokers and consumed less than a liter or 1-2 liters of water daily. The most common health problem among the sample was diabetes, followed by blood pressure issues. It is clear from **Figure (2)** which relates to the distribution of the study sample according to health problems, that the Percentage of diabetes problems reached (24%), followed by the highest Percentage of blood pressure problems, which amounted to (30%), then the Percentage of diabetes and pressure problems amounted to (14%), followed by the lowest Percentage. For heart disease problems, it amounted to (6%),

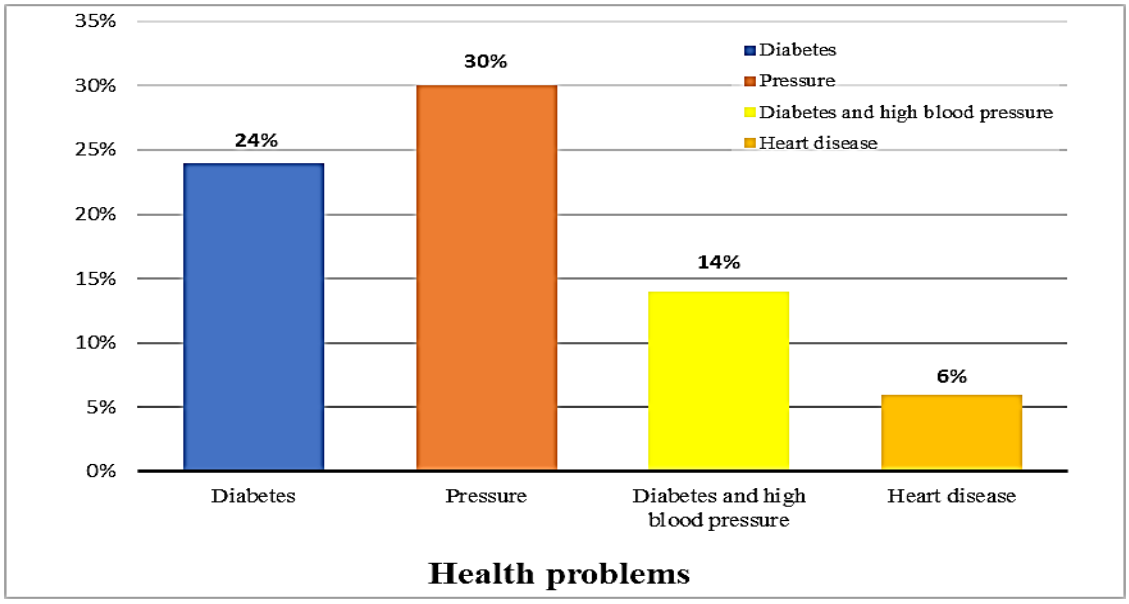

Figure 2: Distribution of the study sample according to health problems.

It is clear from Figure 3 which relates to the distribution of the study sample according to meat and eggs, that the Percentage of red meat amounted to (88%), followed by the highest Percentage of chicken, which amounted to (96%), then the Percentage of fish, which amounted to (68%), followed by the Percentage of liver, which amounted to (62%), while the Percentage in Egg was (84%) - while the lowest Percentage was in cured meat, which amounted to (28%).

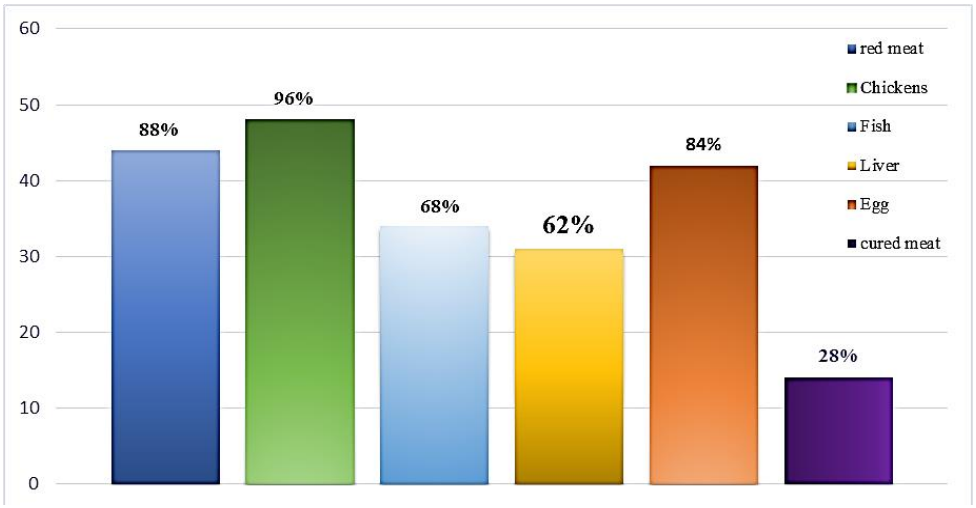

Figure 3: Distribution of the study sample according to meat and eggs.

It is clear from Table (6) which relates to the distribution of the study sample according to milk and dairy products, that the Percentage of milk was (82%), then, the lowest Percentage was for yogurt, which was (48%), while the Percentage of Laban was (66%), followed by the highest Percentage for cheese, where It reached (86

Table 6: Distribution of the study sample according to milk and dairy products.

Milk and dairy products	Frequency	Percentage
Milk	41	82%
Yoghurt	24	48%
Laban	33	66%
Cheese	43	86%

It is clear from Figure (4) which relates to the distribution of the study sample according to grains, that the highest Percentage was for pasta, which amounted to (100%), followed by the Percentage of rice and white bread, which amounted to (96%), then the Percentage of couscous, which amounted to (92%), followed by the lowest Percentage for brown bread. It reached (32%), then the Percentage of pastries reached (84%),

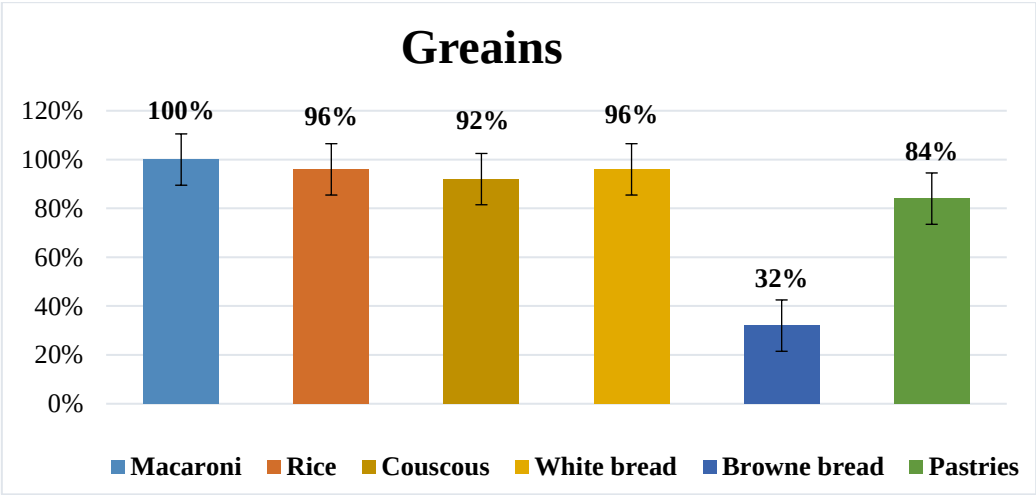

Figure 4: Distribution of the study sample according to grains.

It is clear from Figure (5) which relates to the distribution of the study sample according to legumes, that the Percentage of beans reached (72%), then the Percentage of lentils, which amounted to (68%), followed by the highest Percentage of chickpeas, which amounted to (74%), then the lowest Percentage of broad beans, which amounted to (46%),

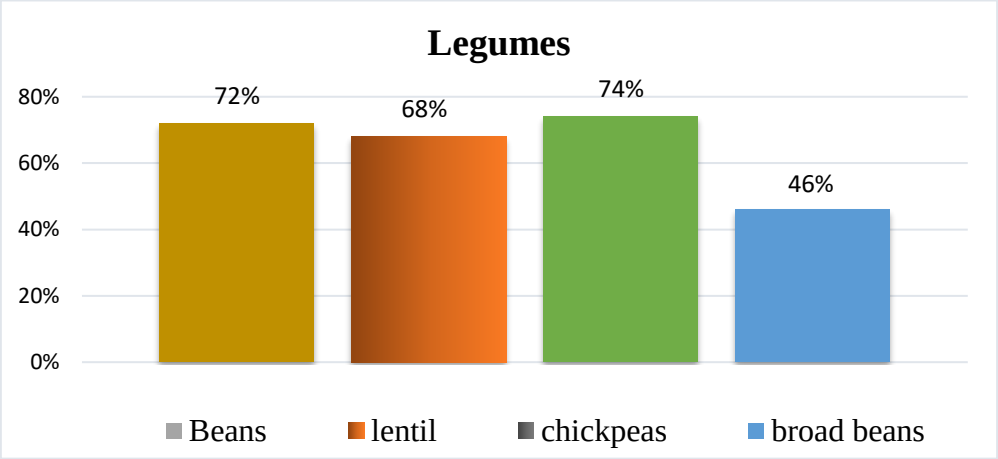

Figure 5: Distribution of the study sample according to legumes.

It is clear from Table (7) which relates to the distribution of the study sample according to nuts, that the highest Percentage was for almonds, which was (54%), then, the lowest was for cashews, which was (42%), followed by the Percentage of peanut, which was (52%), and the Percentage of sunflower seed, which was (44%).

Table 7: Distribution of the study sample according to nuts.

Nuts	Frequency	Percentage
Almonds	27	54%
Cashew	21	42%
peanut	26	52%
sunflower seed	22	44%

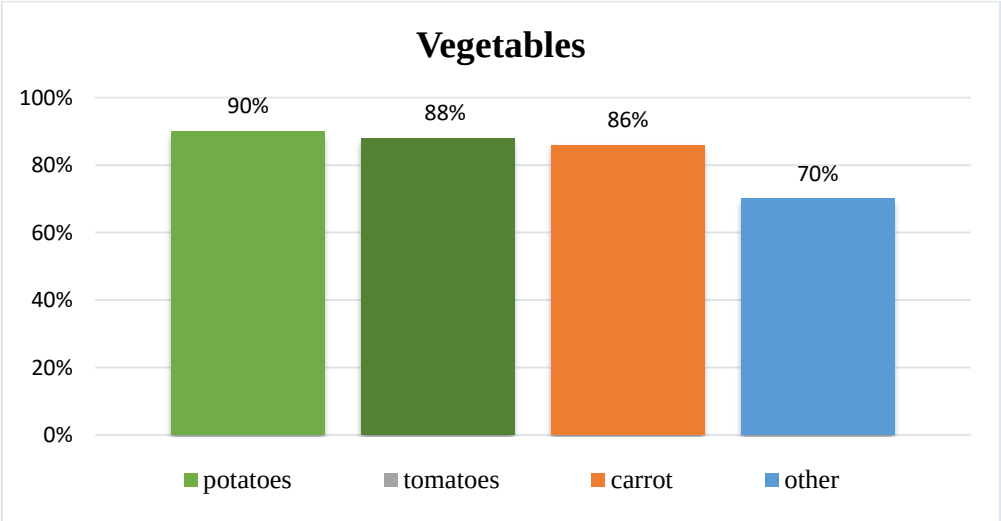

Figure 6: Distribution of the study sample according to vegetables.

It is clear from Table (8) which relates to the distribution of the study sample according to fruits, that the lowest Percentage was for bananas, which amounted to (30%), followed by the highest Percentage for apples, which amounted to (94%), then the Percentage of red watermelon, which amounted to (86%), followed by the Percentage of other fruits, which amounted to (78%), then the Percentage of dried fruits reached (76%),

Table 8: Distribution of the study sample according to fruits.

Fruits	Frequency	Percentage
Banana	15	30%
Apples	47	94%
Watermelon Red	43	86%
Other	39	78%
dried fruit	38	76%

It is clear from **Figure (7**) which relates to the distribution of the study sample according to fats and oils, that the highest Percentage is for olive oil, which reached (92%), then the Percentage of butter, which amounts to (60%), followed by the Percentage of vegetable oil, which amounts to (82%), then the lowest Percentage. The Percentage of ghee reached (26%)

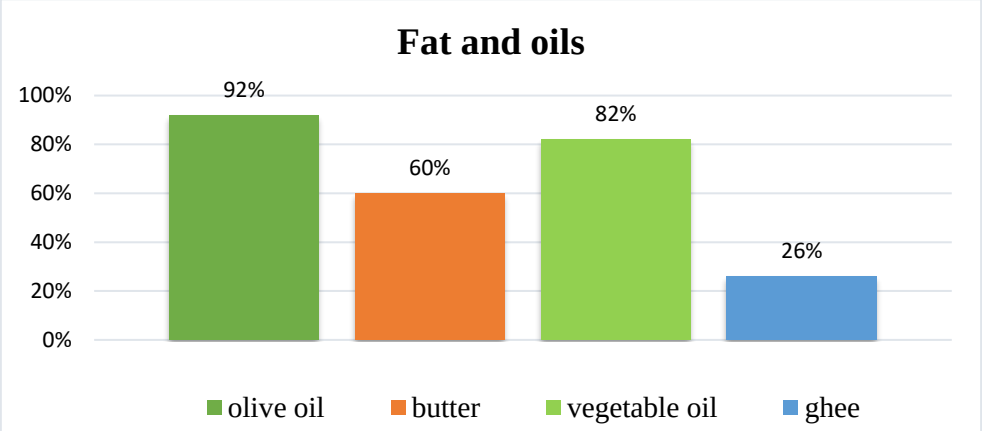

Figure 7: Distribution of the study sample according to fats and oils.

It is clear from Table (9) which relates to the distribution of the study sample according to beverages, that the Percentage of drinking coffee reached (94%), followed by the highest Percentage of drinking tea, which amounted to (96%), then the Percentage of drinking natural juices, which amounted to (56%), followed by the Percentage of drinking Manufactured juices amounted to (74%), then the Percentage of soft drinks amounted to (64%), and finally the smaller Percentage that was for other drinks amounted to (30%).

Table 9: Distribution of the study sample according to drinks.

Drinks	Frequency	Percentage
Coffee	47	94%
Tea	48	96%
natural juices	28	56%
processed juices	37	74%
soft drinks	32	64%
Other	15	30%

It is clear from Table (10) which relates to the distribution of the study sample according to sweets, that the Percentage of sweets reached (72%).

Table 10: Distribution of the study sample according to sweets.

Sweets	Frequency	Percentage
Candies	36	72%

It is clear from figure (8) which relates to the distribution of the study sample according to Canned food, that the highest Percentage was for tuna (88%), followed by the Percentage for olives (78%), then the lowest Percentage was for sardines (10%), and finally the other Percentage was (24%).

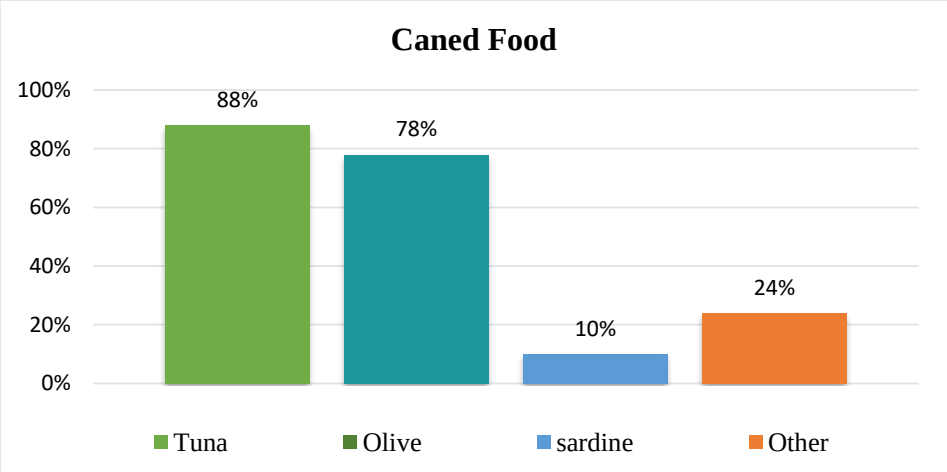

Figure 8: Distribution of the study sample according to canned food.

It is clear from figure (9) which relates to the distribution of the study sample according to energy need compared to consumption, that the lowest energy need amounted to (32%), followed by the highest Percentage to equal energy need, which amounted to (38%), then a greater Percentage of energy amounted to (30%),

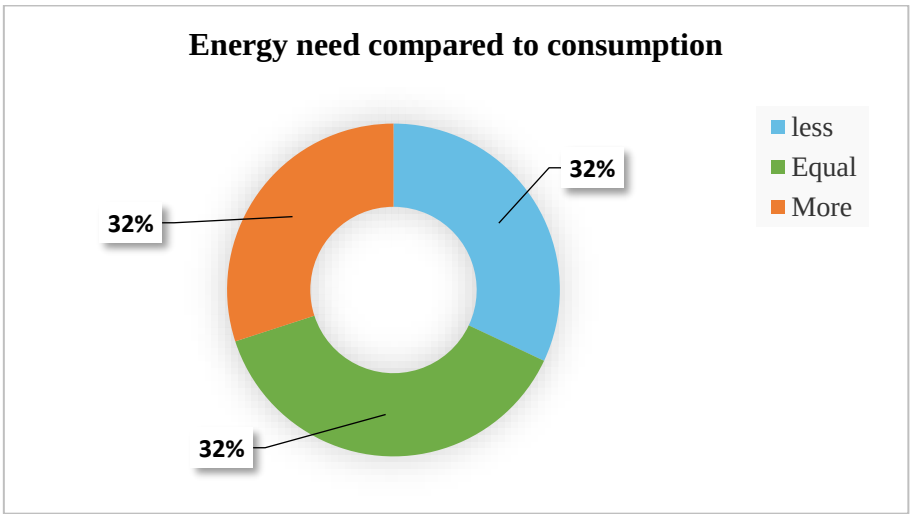

Figure 9: Distribution of the study sample according to Energy need compared to consumption.

It is clear from **Figure (10**) which relates to the distribution of the study sample according to the need for protein compared to consumption, that the highest Percentage was for the least need for protein, which amounted to (62%), followed by the equal Percentage for the need for protein, which amounted to (26%), while the lowest Percentage was for the most no need for protein. It reached (12%), and Figure (19) also shows this.

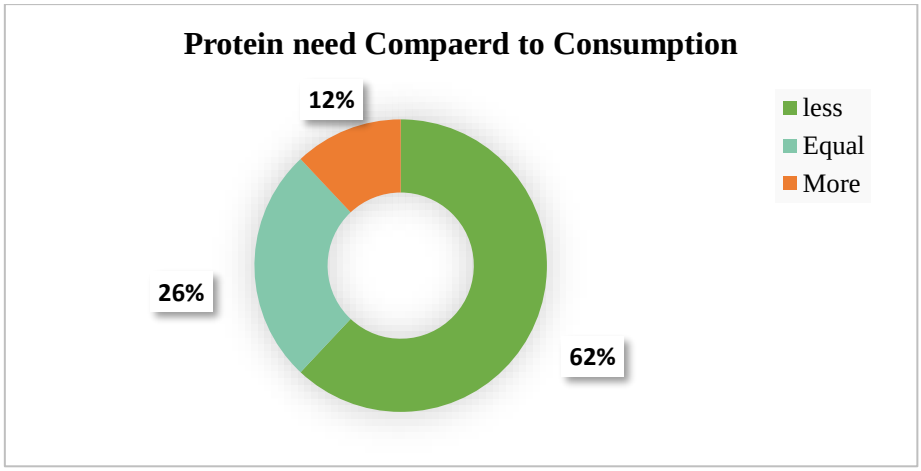

Figure 10: Distribution of the study sample according to need for protein compared to consumption.

It is clear from Table (11) which relates to the distribution of the study sample according to energy consumption, that the lowest Percentage of answers was yes, which was (38%), followed by the highest Percentage of answers, no, which was (62%),

Table 11: Distribution of the study sample according to energy consumption.

Energy consumption	Frequency	Percentage
Yes	19	38%
No	31	62%
Total	50	100%

It is clear from **Figure (11**) which relates to the distribution of the study sample according to Protein consumption, that the lowest Percentage of answers was yes, which was (26%), followed by the highest Percentage of answers, no, which was (74%).

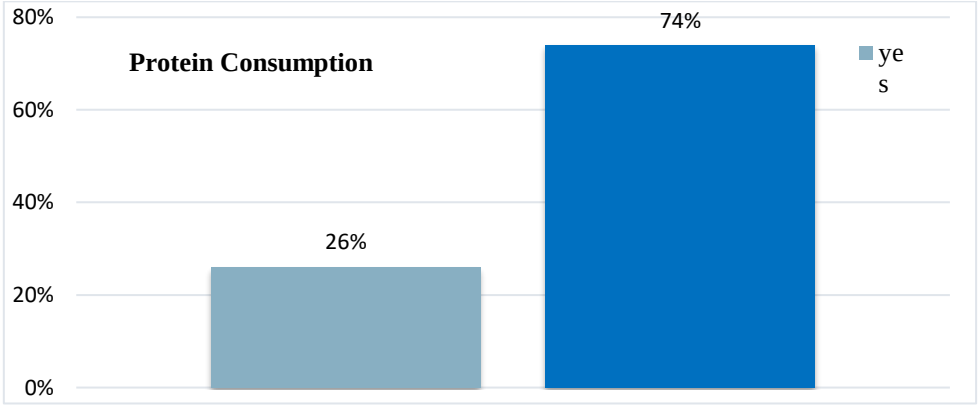

Figure 11: Distribution of the study sample according to Protein consumption.

It is clear from Table (12) which relates to the distribution of the study sample according to HGP, that the highest Percentage is for the insufficient indicator (anemia index >10), which reached (54%),

followed by the Percentage of the normal level, which reached (44%), and then the lowest Percentage for the abnormal indicator. < 13 and amounted to (2%).

Table 12: Distribution of the study sample according to HGP.

HGP	Frequency	Percentage
insufficient (indicator of anemia) <10	27	54%
normal level (sufficient)10-12	22	44%
higher than normal >13	1	2%
Total	50	100%

It is clear from Table (13) which relates to the distribution of the study sample according to Albumen, that the highest Percentage is for the normal 35-50, which reached (52%), followed by the attrition Percentage of 35, which reached (42%), and then the lowest Percentage for the attrition cutoff -25, which amounted to (6%).

Table 13: Distribution of the study sample according to Albumen.

Albumen	Frequency	Percentage
normal 35-50	26	52%
depletion<35	21	42%
sever depletion<25	3	6%
Total	50	100%

It is clear from Table (14) which relates to the distribution of the study sample according to PO4, that the lowest Percentage reached the normal level (48%), followed by the highest Percentage of those reaching the normal level (52%), and Figure (24) also shows this.

Table 14: Distribution of the study sample according to PO4.

Po4	Frequency	Percentage
Normal level	24	48%
Up normal level	26	52%
Total	50	100%

It is clear from **Table(15**), which relates to the distribution of the study sample according to Iron, that the highest Percentage of up normal males more than females, which amounted to (36%) than (28%), followed by normal males more than females, which amounted to (28%) than (8%), and Figure (25) also shows this.

Table 15: Distribution of the study sample according to Iron.

Iron	Frequency		Percentage	
Gender	Male	Female	Male	Female
Up Normal	18	14	36%	28%
normal (Male 80-180) (Female60-160)	14	4	28%	8%
Total	32	18	64%	%36

The results of **Table (16)** showed that there were differences between the values of the mean Energy need and Energy consumption measurement, as the difference between the two averages was (+0.36) and the correlation coefficient was (0.818), and the correlation was significant between the Energy need and Energy consumption, as it reached (p-value = .000). It is less than (0.05) between the Energy need and Energy consumption measurement. To ensure the validity of these differences in terms of their significance, the researchers used the (t) test for two non-independent (linked) samples

Table 16: The results of the test for the level of Energy need and Energy consumption.

Energy need		Energy consumption		The difference between the two means	Correlation	p-value
Mean	Std. D	Mean	Std. D	+0.36	0.818	0.00
1.98	0.795	1.62	0.490			

It is clear from Table (17) that the value of (t =5.260) and the value of statistical significance (p-value = .000), which is less than the level of significance (.05)), which indicates the existence of statistically significant differences in the level of Energy need and Energy consumption, and Figure (26) shows the mean of the Energy need and Energy consumption.

Table 17: Results of answering the First question.

Df	t-test	p-value
49	5.260	0.000

The results of Table (18) showed that there were differences between the values of the mean Protein need and Protein consumption measurement, as the difference between the two averages was (-0.240) and the correlation coefficient was (0.423), and the correlation was significant between the Protein need and Protein consumption, as it reached (p-value = .002). It is less than (0.05) between the Protein need and Protein consumption to ensure the validity of these differences in terms of their significance, the researchers used the (t) test for two non-independent (linked) samples,

Table 18: The results between test for the Protein need and Protein consumption.

Protein need		Protein consumption		The difference between the two means	Correlation	p- value
Mean	Std. D	Mean	Std. D	-0.240	0.423	0.002
1.500	0.707	1.740	0.423			

It is clear from Table (19) that the value of (t =5.260) and the value of statistical significance (p-value = .000), which is less than the level of significance (.05)), which indicates the existence of statistically significant differences in the level of Energy need and Energy consumption, and Figure (27) shows the mean of the Energy need and Energy consumption.

Table 19: Results of answering the Second question.

Df	t-test	p-value
49	-2.585	0.013

Discussion

Patients' assessment in this study showed significant deficiencies in terms of quantitative and qualitative measurement of food intake when compared with specific recommendations for individuals on dialysis and guidelines for a healthy diet. The study sample was classified according to body mass index, where the lowest Percentage of “underweight” mass was (6%), followed by the “normal” mass Percentage of (28%), then the highest Percentage of overweight and obesity was (66%), which indicates the prevalence Widespread malnutrition among patients, while another study [3] found the Percentage of individuals with a body mass index (20 kg/m2, or kg) less than this value (19.4%), and the body mass

index (75.0%) of patients and the analysis was in the normal range, The rest were obese . According to the results of the current study, 32% of HD patients were eating less than (35 calories per kg/day), 38% were eating their requirement, and 30% were taking more than their need. Also, 62% of patients were not eating their protein requirement (1.2 g/kg/day), 26% are getting their recommended intake and only 2% are getting more than their recommended intake. A number of studies into insufficient energy and protein intake were reported by [7] that daily energy intake was also inadequate in the majority of patients with an average dietary calorie intake of 22.17±5.125 kcal/kg per day and dietary protein intake was lower from 1.2 g/kg/day. In a study [3], the majority of HD patients in both groups eat less of 35 kcal/kg/day and more than five HD patients eating less than 1 g/kg/day did not reach the recommended intakes for dietary energy and protein, respectively. Also, it was noted that [23], protein and energy intake is often low due to the underlying disease, psychosocial factors, and uremic anorexia. Among the individuals evaluated in this study, average protein intake was adequate in more than two-fifths of HD patients. This result was consistent with [3; 5] who reported that increasing daily protein intake was ≥1.0 g/kg/day or greater increased survival rates of HD patients below this level. In addition, [8] Concluded that the average dietary protein intake was 1.18 ± 0.23 g of proteins per kilogram of adjusted weight. Hemodialysis patients usually suffer from a deficiency in hemoglobin, an observation that is consistent with the results of this study, as 54% of patients had an indicator of anemia (<10), The Percentage of patients suffering from iron deficiency reached 64%. A study showed [24] The prevalence of anemia among dialysis patients in north-western Libya is very high, with the total prevalence rate reaching (97.8%), More than half of the patients had a high level of phosphorus, which poses a risk to their health, and their Percentage reached 52%, They need to control the amount of phosphorus consumed in food, as dialysis alone is not enough to control it. As for the rest of the patients, their phosphorus levels were at a normal level. Control the amount of the hemodialysis process is known to lead to the loss of nutrients through filtration during dialysis, and the dialysis procedure itself is a catabolic event responsible for protein catabolism (albumin breakdown), meaning that the patient loses during the dialysis process an amount of blood proteins. This study observed that about more than half of the 26 patients had albumin levels within the normal range, while 21 patients had lower levels, and 3 patients suffered from severe deficiency. Regarding chronic diseases, the results showed that most patients suffer from chronic diseases associated with dialysis, where the highest Percentage represents blood pressure, which is 30%, followed by diabetes, which is 24%, and 14% for patients who suffer from both, which are considered one of the most important causes of infection, and also from Factors that may increase the risk of kidney failure, and the rate of heart disease reached 6%. Studies [10] indicate that physical activity is linked to improved results in dialysis patients, and that increasing the level of physical activity is associated with a lower mortality rate. This study showed that 12% of dialysis patients were inactive and 46% of them enjoyed light activity, followed by 32% of them, their activity was moderate and 10% were active. 46% of patients consume one to two litters of water per day, while 48% consume one litter per day, and 6% of them consume two to three litters per day.

Water or fluids are generally removed from the body during dialysis, but also drinking more fluids than the recommended amount between treatments may lead to life-threatening complications, such as heart failure or fluid build-up in the lungs (pulmonary edema).

Regarding the dietary pattern of patients:

Figure 3: 88% of patients consumed red meat, followed by the highest Percentage of chicken, which reached 96%, then the Percentage of fish, which reached 68%, followed by the Percentage of liver, which reached 62%, while the Percentage in eggs was 84% - and less Percentage in processed meat, which amounted to (28%). It is recommended to consume protein for dialysis patients in good quantities and higher than others, based on the clinical practice guide KDOQI (Kidney Disease Outcomes. Quality Initiative) for nutrition 2017, as it is necessary to compensate for what is lost during dialysis, taking care not to exceed it, as food sources of protein usually contain It contains high amounts of phosphorus [15].

Table 6: We noticed a large consumption of milk and its derivatives, so the amount of its consumption must be controlled because it contains a high Percentage of phosphorus, and at the same time calcium, which is considered necessary for bones, so it is important to maintain its intake in moderate quantities.

Figure 4: According to the results, patients' consumption and dependence on simple carbohydrates is very high. The special diet for kidney patients should be richer in complex carbohydrates than simple carbohydrates in order to provide the body with the necessary fibre and energy in order to reduce the body's breakdown of proteins as a source of energy.

Figure 5: the study have noticed that patients' consumption of legumes is not large, and although they contain a high Percentage of phosphorus and potassium, studies [18] confirm that when using different

cooking techniques: soaking, pressure cooking, and regular cooking, the Percentage of potassium and phosphorus is reduced to acceptable levels to consume it.
Table 7: As for nuts, it is preferable for the patient to avoid them or reduce them as much as possible, as most types of nuts are rich in phosphorus, which also accumulates in the patient's body, and most of them are salted.
Figure 6 & Table 8: It is generally not recommended to eat large quantities of vegetables due to the potential risk of hyperkalaemia, especially tomatoes, whose consumption rate reached 88%. It is also preferable to eat cooked or boiled vegetables instead of fresh ones to reduce the Percentage of potassium in them. As for fruits, the lowest Percentage was for bananas (30%), as it contain a high percentage of potassium, which leads to serious problems when it accumulates in the blood, so patients should avoid it. The same applies to dried fruits (76%), and the highest percentage was for apples, which reached (94%). Because it contains a low percentage of potassium, phosphorus, and sodium, it is a great choice for a kidney-friendly diet. Then comes the Percentage of red watermelon (86%), followed by the Percentage of other fruits (78%).
Figure 7: %92 of patients consume olive oil, which is a good Percentage because it is a source of healthy fats that does not contain phosphorus and is low in potassium and sodium.
Table 9: The patient must be aware that food items contribute to increasing the amount of fluids in the body, although it may be less obvious. He can use small cups to facilitate determining the amounts consumed per day. Soft drinks also contain additives such as phosphorus, which is added to improve flavor and increase shelf life, as well as prevent discoloration, which is something people with kidneys should avoid.
Figure 8: Most canned foods contain high amounts of sodium, as tons of salt are added to them for preservation. Consumption should be limited, and it is better to choose types that do not contain any added salt, but depending on the result, consumption of canned foods is considered large.
Dietary patterns describe the eating behaviour and habits of individuals. Unhealthy dietary patterns provide individuals with limited nutrients with an increased risk of nutrition-related diseases. Low income is also associated with poor quality of nutritional intake compared with high-income individuals [25], low-income individuals consume fewer fruits and vegetables, more sugar-sweetened beverages, and have poorer overall diet quality this is confirmed by the results of our study.
Limitation. This study was conducted at Al-Zarrouk Centre for Artificial Kidney Services. Therefore, the sample of patients may not represent the typical group found in the Misurata region, as there are two dialysis centres in the city. In addition, the number of patients included in this study was moderate, and we recommend conducting further multi-centre studies with a larger number of patients for better evaluation.
We also recommend conducting a survival trial to evaluate the relationship between low serum albumin and patient survival

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Conclusion

Based on the data obtained using two types of nutritional intake assessment tools (FFQ & 24 recall hours) and a personal interview, it became clear that the majority of patients undergoing dialysis suffer from malnutrition and do not consume their recommended needs of energy and protein, and that about half of the patients have insufficient levels of hemoglobin and suffer from a deficiency in albumin, and therefore they need to adhere to a therapeutic diet that restricts nutrients according to their needs in order to reduce complications and improve their physical and psychological condition ,There is also a great need for nutritional education for patients and their family members

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