Role of Nutritional Assessment for Improving Children Renal Failure Health

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Abstract

Study was carried out on 30 children 15 males and 15 females, their ages ranged from 6 to 18 years, with end-stage renal disease (ESRD) on regular hemodialysis (HD) therapy. All children were undergoing HD three times per week, with each dialysis session lasting for three to four hours. Patients were dialyzed on Fresenius 4008B dialysis machine (Germany).Results showed that the percentage of congenital abnormalities among the patients was 7 (23.33%), urological abnormalities percentage was 8 (26.66%), glomerular diseases percentage was 10 (33.33%) and the percentage of unknown causes was 5 (16.66%).The mean duration between discovery of chronic kidney disease (CKD) and beginning of HD was 4.0±1.5 years and the mean duration of HD was 3.19±1.13 years. There was difference in the food intake per week between the patients as regard cereals, sweets, animal sources, plant sources, vegetables and fruits. There was significant increase in the mean of weight after educational sessions and nutritional intervention. There was non-significant increase in the mean height of the patients after educational sessions. There was significant increase in the mean level of hemoglobin and in the mean level of serum albumin after educational sessions. The mean of creatinine and BUN of patients were also increased, which were 8.7±1.8 and 70.83±26.57 mg/dl, respectively. A decrease in the mean serum calcium of patients as it was (8.87±1.24) mg/dl and increase in the mean phosphorous of patients as it was (4.5±1.51) mg/dl was observed. In conclusion, it was noted that attention to balanced food intake and increased educational sessions for children and their families led to improved cases of children with kidney failure.

Key words: Children, Renal failure, and Nutritional assessment.

INTRODUCTION

The kidney plays a vital role in the maintenance of normal blood volume/pressure and the regulation of acid -base balance. Approximately one - fourth of the cardiac output is filtered through the kidney. The kidneys also play a great role in urine excretion as they are the pathway for removal of the waste products of absorption and metabolism which include ammonia, urea, creatinine, phosphorus, water, sodium and potassium. The kidney produces erythropoietin hormone, deficiency of this hormone results in profound anemia. A decrease in kidney functions greatly affects metabolism and nutritional status **(Miller and Klahr, 2005)**.

The Kidney Disease Outcomes Quality Initiative (KDOQI) working group of the National Kidney Foundation (NKF) defined CKD as "evidence of structural or functional kidney abnormalities (abnormal urinalysis, imaging studies, or histology) that persist for at least 3 months, with or without a decreased glomerular filtration rate (GFR), as defined by a GFR of less than 60 mL/min per 1.73 m^2 **(Kopple, 2001)**

Levey *et al.*, 2003 reported that among a large number of initiatives aimed at increasing early awareness of CKD, the National Kidney Foundation's KDOQIclinical practice guidelines for classification and staging of CKD receives most attention and acceptance. In addition to a working definition, KDOQI proposes a classification system based on severity determined by level of kidney function, calculated from the estimated GFR (eGFR), irrespective of the cause of kidney disease.

Chronic kidney disease is characterized by an irreversible deterioration of renal function that gradually progresses to ESRD. Chronic renal failure (CRF) has emerged as a serious public health problem. The incidence of CRF in children has steadily increased, with poor and ethnic minority children disproportionately affected **(USRDS, 2010).**

Chronic kidney disease has become a worldwide epidemic with an occurrence rate in the population of approximately 5%–15%. Prevalence of ESRDpopulation relying on dialysis is also on the rise **(De Nicola and Zoccali, 2016)**.

The World Health Organization defines malnutrition as "bad nourishment," characterized by "inadequate or excess intake of protein, energy, and micronutrients such as vitamins, and the frequent infections and disorders that result **(Friedman and Fadem, 2010).**

Contributing factors to this malnutrition include poor appetite, various comorbidities, dietary restrictions, inflammation, infection, metabolic acidosis and oxidative stress **(Morais *et al.*, 2005).**

Sessions of knowledge and education about nutrition conducted and assessment of the attitude of the patients toward practicing the nutritional knowledge was carried out by the evaluation of body mass index (BMI) and laboratory markers **(Foster and Leonord, 2005)**.

Patients with CRF may be hypercatabolic for a variety of reasons (acidosis, infection, heart failure, and other comorbidity). If measures taken to increase the oral intake of nutrients fail, artificial nutrition is indicated. The most common method in HD patients is intradialytic parenteral nutrition (IDPN), which implies that a mixture of amino acids, glucose, and lipids is infused into the extracorporeal blood line during dialysis (4–5 h) **(Foulks, 1999)**.

Nitrogen requirements in acute renal failure vary with the extent of net protein catabolism, which depends on the severity of trauma, the presence of infection, and other catabolic factors. Recommended intakes in acute renal failure may be based on excess urea nitrogen over nitrogen intake. Recommended nitrogen intake in adult patients is 0.10–0.15 g/kg body weight/day (protein intake 0.6–0.9 g/kg day) when catabolism is mild, but as high as 0.2–0.3 g/kg day (protein intake 1.3–1.9 g/kg day) in severely catabolic patients. Recommended energy intake is between 30 and 40 kcal/kg, depending on the severity of the condition. Infants and children have higher nitrogen and energy requirements. Requirements for vitamins and minerals should be satisfied **(B´ar´any and Alvestrand, 1998)**.

Dietary proteins are digested to amino acids which can be further broken down to generate both acids and bases. Proteins from meat and dairy products (from a typical Western diet) generate predominantly acidic products including hydrogen chloride (HCl), sulfuric acid (H_2SO_4) and phosphoric acids (H_3PO_4). These acids are nonvolatile and rely on kidney for their excretion (primarily in the form of ammonium salts and phosphoric salts) **(Ikizler *et al.*, 2013)**.

Suboptimal nutritional intake is common in the population of CKD and ESRD and poses a direct risk for protein malnutrition. Suboptimal nutritional status has been related to multiple alterations including metabolic acidosis, bowel flora alteration and hormonal dysregulation, all of which could promote kidney disease progression and increase morbidity and mortality. This review presents updated information, intergrading previous knowledge with a specific focus on the unique aspect of protein balance and nutrition in CKD and ESRD. Current practice recommendations are presented **(Gracia-Iguacel *et al.*, 2013)**.

Materialsand Methods

Materials

This study was carried out at Pediatric Nephrology Unit, Menoufia University Hospital, after approval of the Local Institutional Ethical Committee of Menoufia University Hospital; the present study was carried out during the period from May 2017 to April 2018.

- The study was carried out on (30) children with ESRD on regular HD therapy.
- Their ages ranged from 6 to 18 years.
- They were (15) males and (15) females.

-Inclusion criteria: - Patients with ESRD of different causes.

- Duration of HD more than 6 months.

The cause of ESRD in our patients was congenital abnormalities in 7 cases (23.33%), urological abnormalities in 8 cases (26.66%), glomerular diseases in 10 cases (33.33%) and unknown causes in 5 cases (16.66%).

Methods

All children were undergoing HD three times per week, with each dialysis session lasting for three to four hours. Dialysis was started when GFR is equal or less than 15 ml/min./1.73m^2.Patients were dialyzed on Fresenius 4008B dialysis machine (Germany), at blood flow rate = 2.5X weight (Kg) +100m1/min. **(Daugirdas, 2001)** using polysuphane hollow fiber dialysers suitable for the surface area of the patients (Fresenius F3=0.4m^2, F4=0.7m^2, F5=1.0m^2 and F6-1.2m^2). Bicarbonate dialysis solutions were used.

All children were receiving (before and during the study) supportive therapy in the form of subcutaneous erythropoietin in a dose of 50IU/Kg/setting, intravenous iron dextran 100 mg/week, oral folic acid 1 mg/day, oral calcium 1000 mg/day, oral vitamin D (one alpha) in a dose of 0.01-0.05mg/Kg/day and oral antihypertensive medications for hypertensive patients. All investigations were carried out before and after the HD session.

Exclusion criteria:

- Irregular attendance of HD session.
- Patients older than 18 years were excluded from study.
- Malnutrition due to other diseases.

All patients were subjected to the following (after taking written consent from their parents before enrollment in the study and all the participant names were hidden and replaced by code numbers to maintain privacy of the participants):

(1) Full history taking:

- The duration of renal insufficiency.
- The duration of HD.
- Symptoms related to malnutrition as fatigue, weight, pallor, growth retardation and appetite.

(2) Full clinical examination:

General examination: with emphasis on weight, height & blood pressure.

Weight:

Weight was measured with the patient bare-footed, jackets and pullovers took off. The apparatus used for measuring weight was the spring scale, made in Germany, placed on a hard, leveled uncarpeted floor. Weight was measured to the nearest half kilogram. Body weight was expressed as percentage (%) of the standard body weight for age, where the standard body weight is defined as the 50th percentile weight for age. For children on dialysis group, dry weight was used as percentage of the standard body weight for age **(Zerfas *et al.*, 1977).**

Height:

Height was measured while the patient was standing bare-feet. The head was looking directly forward and the patient stretching his/her fullest height. The height was measured using a standard tape fixed vertically on the wall. The patients were instructed to adhere tightly to the wall at the shoulders, buttocks, back of knees and heel. Height was measured in centimeters to the nearest half centimeter. Height for age was calculated as percent from the ideal height (50^{th} percentile height for age) **(Zerfas *et al.*, 1977).**

Body mass index(BMI):

Body mass index is defined as the body mass (weight in kg) divided by the square of the body height in meters, and then categorize that person as underweight, normal weight, overweight, or obese based on that value **(Malcolm, 2015).**

Blood pressure measurement:

Arterial blood pressure was measured by the auscultatory method using a mercury sphygmomanometer with the patient in the semi setting position after 10 minutes of rest, in the non-fistula arm using an appropriate sized cuff. Arterial blood pressure was taken as the mean value of 3 successive readings in 3 different days **(Frazier, 2009).**

Systemic examination:

- -Neurological examination.

- - Chest examination.
- - Heart examination.
- - Abdominal examination.
- - Renal examination (tenderness, pain, size, etc).

(3) Laboratory investigations:

- -All patients will be subjected to evaluation of :
- -Hemoglobin (Hb) (Van-Kampenand Zijlstra, 1967).
- -Serum albumin.
- -Serum creatinine and BUN (Fawcett and Scott, 1960).
- -Electrolytes in the form of: serum Ca, serum P.
- -Haematocrit and CRP.

(4) Dietary and social survey:

• Discuss dietary and social status of patients.

1) Dietary status discusses:

Type and amount of food per week include:

1- Cereals (bread. rice or macroni).
2- Sweets (jam, honey molasses).
3- Animal sources (meat, fish. eggs, milk products).
4- Plant sources (beans, lentils).
5- Vegetables (fresh or cooked).
6- Fruits **(Mougi*et al.*, 2007).**

Nutritional guidelines in CRF:

1) Calorie intake should be adequate in order to prevent tissue loss and also for protein build up. About 40-50cal/kg/day are sufficient.
2) At least 50% of prescribed protein should be of high biological value and should be distributed in all the meals for better utilization.
3) Vegetables and pulses should be taken after leaching potassium.
4) Low potassium fruits should be eaten once or twice a week.
5) Salt should be restricted in case of edema.
6) Fluids should be restricted to the prescribed amounts.
7) Spices and condiments should be used in small quantities.
8) Foods high in sodium and potassium should be avoided.
9) Rice products are much better tolerated than wheat. Therefore give rice flakes, items prepared out of rice flour, sugar, boiled sweets, unsalted butter, unsalted margarine could be used. These foods have a very low content of sodium, potassium and protein but provide energy
10) Fruit juices, preservatives should be avoided.
11) Methods that should be adopted for cooking are steaming,, roasting, pressure cooking, stir frying, and microwaving,
12) Fruits recommended for patients are guava, apple, pear **(Abd El-Nabi, 2007)**.

2) Social status discusses:

a- Education of the mother (Illiterate, Primary, Secondary and University).
b- Work of the mother (Housewife, Unskilled worker, Skilled worker).
c- Father (Working, Not working, Dead).
d- Work of the father (Unskilled worker, Skilled worker, Professional)
e- Origin (Urban, Rural) **(Mougi*et al.*, 2007).**

(5) Nutritional educational sessions:

Nutritional educational sessions were held for a period of six months, close observation and diet modification through good communication with family and giving proper nutritional advice to the patients then family understanding was checked. Every diet should be individualized to the patient according to his case.

Patients were supplemented by water-soluble vitamins, folic acid, vitamin C, zinc and iron, and then reassessment of nutritional status is done by anthropometric measurements and laboratory investigations.

Statistical analysis:

Data were collected and entered to the computer using SPSS (Statistical Package for Social Science) program for statistical analysis.

Data were entered as numerical or categorical, as appropriate.

Two types of statistics were done:

***Descriptive statistics:**

- Quantitative data were shown as mean, SD, and range.
- Qualitative data were expressed as frequency and percent at 95% confidence interval (95% CI).

*** Analytical statistics:**

- Chi-square test (X2) were used to measure association between qualitative variables.
- Mann Whitney U test were done to compare means and SD of 2 sets of quantitative data.
- P (probability) value considered to be of statistical significance if it is less than 0.05 **(Levesque, 2007).**

RESULTS AND DISCUSSION

Demographic characteristics of the studied group:

Data presented in Table (1) shows the number of patients with CRF. It is obvious that the numbers of patients with CRF were 30 patients, 15 of them were males (50.0%) and l5 were females (50.0%), and the mean age was (14.5±3) years.

Percentage of congenital abnormalities among the patients:

Data given in Table (2) shows the percentage of congenital abnormalities among the patients. It is clear to notice that the percentage of congenital abnormalities among the patients was 7 (23.33%), urological abnormalities percentage was 8 (26.66%), glomerular diseases percentage was 10 (33.33%) and the percentage of unknown causes was 5 (16.66%). This is in accordance with **Hala*et al.*,)2015(** who reported that unknown causes, nephritis, urological causes and congenital abnormalities were the most common causes of CRF in Egyptian children. The strikingly high percentage of unknown causes of CRF among the patients may be due to the cases that were usually referred later; another factor could be the delayed diagnoses of cases until CRF occur.

Chronic kidney disease and HD duration among the studied group:

The CKD and HD duration among the studied group are shown in Table (3).It is clear that the mean duration between discovery of CKD and beginning of HD was 4.0±1.5 years and the mean duration of HD was 3.19±1.13 years.

Food intake per week among the studied group:

Data tabulated in Table (4) show food intake per week among the studied group. It is clear to notice that there was difference in the food intake per week between the patients as regard cereals, sweets, animal sources, plant sources, vegetables and fruits. The obtained results showed that the highest cereal (bread and rice or macaroni) food intake recorded for few times per week (1-3)**.** The mean values were 41.67 % and 45.83 %, respectively. While, the lowest values of food intake recorded for bread (never or very rare) and rice or macaroni (most days or all days of week "4-7"), which mean values were 25%.In case of sweets, then ever or very rare food intake recorded for honey and jam. The mean values were 62.50 % and 41.67 %, respectively. While, jam few times per week "1-3" and honey most days or all days of week "4-7" recorded the lowest values, which were 27.15% and 12.50%, respectively. For animal sources, it is clear to mention that meat or fish few times per week "1-3" and eggs recorded the highest food intake. The mean values were 41.67% and 37.5%, respectively while, the lowest values recorded for most days or all days of week "4-7" and never or very rare which were 25.0% and 29.17%, respectively. On the other hand, few times per week "1-3" for beans, never or very rare cooked vegetables**,** most days or all days of week "4-7" for fresh

vegetables and few times per week "1-3" for fruits recorded the highest percentage. The mean values were 37.5%, 62.5%, 45.83% and 62.50%, respectively.

Anthropometric measurements among the studied group before and after educational sessions:

Data tabulated in Table (5) show the anthropometric measurements among the studied group before and after educational sessions. It is obvious that there was significant increase in the mean of weight after educational sessions, as it increased from (34.16±13.5) kg to (39.04±12.1) kg and the mean of BMI was increased from (19.06±4) kg/m^2 to (20.84±3.71) kg/m^2. Table (5) shows also that there was significant difference in weight percentile before and after educational sessions as weight percentile below 3rd was significantly decreased after educational sessions from (62.5%) to (45.8%). On the other hand, there was no significant increase in the mean of the height after educational sessions as it increased from (136.39±16.77) cm^3 to (137.87±17.94) cm. According to **anthropometric measurements**, data indicated that (54.2%) of patients were below 3rd percentile and the mean height of the patients was (136.39±16.77) cm^3. This agreed with **Hala *et al.*, (2015)** who reported that (78%) of patients were short. Also agreement with **Doaa *et al.*, (2015)** who found that renal failure in infancy and early childhood have persistent high standard deviation scores (SDS) for more than-2, when followed longitudinally and a major decline occurs within the first 2 years of life. **After educational sessions**, there was non-significant increase in the mean height of the patients after educational sessions as it increased from (136.39±16.77) cm to (137.87±17.94) cm (p-value≤0.05). This agreed with **Doaa *et al.*, (2015)** who reported that there was no significant increase in the mean height of the patients after educational sessions as it increased from (120.8±19.07) cm to (21.8±19.11) cm. This is due to short period of duration and they need longer follow up and more repeated educational sessions to get better results. **According to weight**, there was decrease in the body weight as (62.5%) of patients were below 3rd percentile and the mean body weight of the patients was (34.16±13.5) kg. This agreed with **Doaa *et al.*, (2015)** who reported that (72.3%) of patients were below 3rd percentile. Also, it is in agreement with **Betul *et al.*, (2011)**who found that (66.8%) of patients were below 3rd percentile. Also, it is in agreement with **Lesley and Vanessa, (2011)** who reported that (78%) of patients were below 3rd percentile. Also, this agrees with

Deeb *et al.*, (2005), as they discussed antioxidants profile in steroid responsive nephrotic syndrome and found that mean body weight and the mean height showed no significant difference from the control group where ($p > 0.05$). After educational sessions, there was significant increase in the mean bodyweight of the patients as it raised from (34.16 ± 13.5) kg to (39.04 ± 12.1) kg, ($p \leq 0.05$).This does not agreewith **Doaa *et al.*, (2015)**, who found that there was no significant decrease in the mean body weight after educational sessions from (27.1 ± 9.05) kg to (26.3 ± 8.99) kg as there was better control of dry weight with less interdialytic weight gain due to lower sodium intake. But this agrees with **El-Shafie *et al.*, (2009)** which in their study diet modification was done to all patients for 3 months, and reported that there was significant increase in the mean body weight as it increased from (19.5 ± 15.7) kg to (23 ± 15.2) kg. This is because aggressive nutritional interventions in the early stages of disease improve nutritional state of these patients and may be critical in the prevention of more serious complications further in the disease process. **According to BMI**, there was decrease in the mean BMI of the patients as it was (19.06 ± 4) kg/m^2.This agrees with **Doaa *et al.*, (2015),** they reported that the mean BMI of the patients was (18.05 ± 2.5) kg/m^2.Also this is in agreement with **Kemal *et al.*, (2003)**, as they found that there was significant decrease in the mean BMI of patients (17.99 ± 2.5) kg/m^{2}as the body weight and the height of the patients were decreased. **After educational sessions**, there was significant increase in the mean BMI of patients as it increased from (19.06 ± 4) kg/m^2 to (20.84 ± 3.71) kg/m^2 ($p \leq 0.05$) as the mean weight was significantly increased after nutritional intervention.

This does not agree with **Doaa *et al.*, (2015)** who reported that there was significant decrease in the mean of BMI after educational sessions as it decreased from (18.05 ± 2.5) kg/m^2 to (17.17 ± 2.6), kg/m^2 as the weight was decreased due to decrease dry weight and less sodium intake. But this agreed with **El Shafie *et al.*, (2009)** as they found that after nutritional intervention, there was increase in the mean BMI as it increased from (15.2 ± 4.5) kg/m^2 to (16 ± 4.4) kg/m^2 because there was significant increase in the body weight after nutritional intervention.

Laboratory parameters among the studied group before and after educationalsessions:

The laboratory parameters among the studied group before and after educational sessions are shown in Table (6). The obtained results indicated that there was significant increase in the mean level of

hemoglobin and serum albumin after educational sessions as the mean of hemoglobin level was increased from (9.35 ± 1.5) g/dl to (10.14 ± 1.3) g/dl and the mean of albumin was increased from (3.3 ± 0.93) g/dl to (4 ± 1.0) g/dl. While other parameters (haematocrit, BUN, creatinine, calcium, phosphorus and albumin)showed non-significant difference before and after educational sessions. **As regard to hemoglobin level**, there was decrease in the mean level of hemoglobin of the patients, as it was (9.35±1.5) g/dl. These results are in agreement with **Doaa *et al.*, (2015)** as they found that the mean level of hemoglobin of patients was (9.40±1.4) g/dl. Also, this agrees with **Arora *et al.*, (2008),** who found that no rmchromicnormocytic anemia in renal failure principally develops from decreased synthesis of erythropoietin, the hormone responsible for red blood cell (RBC) production. It starts early in the course of disease & becomes more severe as the GFR progressively decreases with the availability of less viable renal mass, no reticulocyte response occurs. RBC survival is decreased, and tendency of bleeding is increased from uremia. Other causes of anemia in ESRD patients include chronic blood loss, inflammation, nutritional deficiency & accumulation of inhibitors of erythropiosis. **After educational sessions**, there was significant increase in the mean of haemoglobin of patients as it increased from (9.35±1.5) g/dl to (10.14±1.3) g/d1 (p value≤0.05).This agreed with **Doaa *et al.*, (2015)** who found that there was significant increase in the mean level of haemoglobin after educational sessions as it increased from (9.40±1.40) g/dl to (9.60±1.80) g/d1.Also this is in agreement with **El Shafie *et al.*, (2009)** as they found that there was highly significant increase in the mean level of haemoglobin as it increased from (9.3±1.8) g/dl to (11.5±0.6) gm/dl. This is because of supplementation of Iron and vitamin C introduced to the patients during this period. **As regard to serum Albumin**: There was decrease in the mean level of serum albumin in patients as it was (3.3±.0.93) g/dl. This agreed with **Doaa *et al.*, (2015)** who reported that the mean level of albumin of patients was (3.3±0.3) gm/d1. Also, this agreed with **Rajeev *et al.*, (2015)** as they found that total protein and albumin levels were significantly decreased in the CKD patients.Also, this is in agreement with **Hala *et al.*, (2015)** as they found that hypoalbuminemia was due to haemodilution, nephrotic syndrome or chronic infection and inflammation. Also, this agreed with the finding of the National Health And Nutrition Examination Survey (NHANES)III prevelance study who detected hypoalbunemia in HD patients & considered them as marker of protein energy malnutrition **USRDS, (2004). After educational sessions,** there was significant increase in the mean level of albumin of patients, as it increased from (3.3±.0.93) gm/d1 to (4 ±1) g/d1. (p≤0.05).This agreed with **Doaa *et al.*, (2015)** as they reported that there was significant increase in the mean level of albumin of patients after educational sessions as it increased from (3.60±.0.30) gm/dl to (3.81±1.30) g/dl. This also agreed with **El**

Shafie *et al.*, (2009) who reported that the mean level of albumin was significantly increased after nutritional intervention from (2.4±0.9) g/d1 to (2.9±0.7) g/d1 as the albumin is a nutritional marker and positively affected by good nutrition. **According to kidney function tests,** there was increase in the mean of BUN of the patients, as the mean of BUN was (70.83±26.57) mg/dl. This agreed with **Doaa *et al.*, (2015)** who reported that the mean BUN of patients was (54.3±19.0) mg/dl because the urea is quantitatively the most important solute execrated by kidney and was organic solute detected in blood of patients with kidney failure. Both HD & PD are currently prescribed to achieve target value for urea clearance. Also, this agreed with **(Hala) *et al.*, 2015** as they found that the mean BUN of the patients was (65.77±20.75) mg/dl. **After educational sessions**, there was non-significant decrease in the mean of BUN, as it decreased from (70.83±26.97) mg/dl to (64.3±23.2) mg/dl ($p>0.05$).This does not agree with **Doaa *et al.*, (2015)** who reported that there was no significant increase in the mean BUN of patients after educational sessions, as it increased from (54.3±19.0) mg/d1 to (57±33.9) mg/dl due to higher protein intake. **As regarded to serum creatinine**, there was increase in the mean of creatinine of patients as it was (8.7±1.8) mg/dl. This agreed with **Doaa *et al.*, (2015)** who reported that the mean creatinine of the patients was (5.90±2.20) mg/dl.Also, it is in agreement with **Moushira *et al.*, (2012)** who found that the mean creatinine of the patients was (7±1.8) mg/dl. Also, it agreed with **Lesley and Vanessa, (2011)** who reported that there was significant increase in the mean of creatinine of patients.**After educational sessions,** there was no significant decrease in the mean of serum creatinine, as it decreased from (8.7±1.8) mg/dl to (8.5±2) mg/dl ($p>0.05$). These results are in agreement with **Doaa *et al.*, (2015)** who found that there was no significant decrease in the mean of serum creatinine of the patients from (5.90±2.20) mg/dl to (5.20±1.98) mg/dl indicating better dialysis adequacy with less hypotension episodes due to better control of dry weight with less interdialytic weight gain due to lower sodium intake and better haemoglobin levels, so that, the patients could spend more time on dialysis.

According to serum electrolytes, there was decrease in the mean serum calcium of patients as it was (8.87±1.24) mg/dl and increase in the mean phosphorous levels of patients as it was (4.5±1.51) mg/dl.This results agreement with **Rajeev *et al.*, (2015)** who reported that the mean calcium of patients was (8.03±1.32) mg/dl and the mean phosphorous of patients was (5.01±1.35) mg/dl, this because affection of thyroid gland and PTH, and hyperphosphatemia was due to glomerular damage that lead phosphate retention & tubular injury. **After educational sessions**, there was no significant increase in the mean serum calcium as it increased from (8.87+1.24) mg/dl to (9.3±1.5) mg/dl (pvalue >0.05).

These results are in agreement with **Doaa *et al.*,)2015 (**who reported that the mean calcium increased from (7.7±1.90) mg/dl to (8.5±1.49) mg/dl, this is due to short period of education and follow up.

Table (1): Demographic characteristics of the studied group

Chronic renal failure patients N=30	Mean±SD	Properties
15 (50.0%)	Male	Sex
15 (50.0%)	Female	
6-18		Age (years)
14.5±3	Min-max	

N=Number Min=Minimum
SD=Standard Deviation Max=Maximum

Table (2): Etiology of renal failure among the studied group

Percentage %	Number of patients	The cause of CRF
23.33%	7	Congenital abnormalities
26.66%	8	Urological abnormalities
33.33%	10	Glomerular diseases
16.66%	5	Unknown causes

Table (3): CKD and HD duration among the studied group

Chronic renal failure patients N=30		
Mean± SD	Min-max	
4.00±1.50	0-8	Duration between discovery of CKD and beginning of HD (years)
3.19±1.13	0.13-8	Duration of HD (years)

Table (4): Food intake per week among the studied group

Cases (n=30)		
(%)	No.	
		1- Cereals:
		Bread
25%	6	Never or very rare
41.67%	10	Few times per week(1-3)
33.33%	8	Most days or all days of week(4-7)
		Rice(or macaroni)
29.17%	7	Never or very rare
45.83%	11	Few times per week(1-3)
25%	6	Most days or all days of week(4-7)
		2-Sweets:
		Jam
41.67%	10	Never or very rare
27.15%	7	Few times per week(1-3)
29.17%	7	Most days or all days of week(4-7)
		Honey
62.5%	15	Never or very rare
6 25%	6	Few times per week(1-3)
12.5%	3	Most days or all days of week(4-7)
		3- Animal sources:
		Meat or fish
33.33%	8	Never or very rare
41.67%	10	Few times per week(1-3)
25%	6	Most days or all days of week(4-7)
		Eggs
29.17%	7	Never or very rare
37.5%	9	Few times per week(1-3)
		Milk products
33.33%	8	Most days or all days of week(4-7)
25%	6	Never or very rare
62.5%	15	Few times per week(1-3)
12.5%	3	Most days or all days of week(4-7)
		4-Plant sources:
		Beans
12.5 %	3	Never or very rare
37.5%	9	Few times per week(1-3)

50 %	12	Most days or all days of week(4-7)
		5-Vegetables:
		Cooked vegetables
62.5%	15	Never or very rare
25%	6	Few times per week(1-3)
12.5%	3	Most days or all days of week(4-7)
		Fresh vegetables
20.84%	5	Never or very rare
33.33%	8	Few times per week(1-3)
45.83%	11	Most days or all days of week(4-7)
		6-Fruits:
25%	6	Never or very rare
62.5%	15	Few times per week(1-3)
12.5%	3	Most days or all days of week(4-7)

Table (5): Anthropometric measurements among the studied group before and after educational sessions

P-value (X2)	After educational sessions n=30	Before educational sessions n=30	Anthropometric measurements	
0.815	137.87±17.94	136.39±16.7	Height-(cm) mean±SD	
1	11 45.8% 13 54.2%	11 45.8% 13 54.2%	Average Below 3rd percentile	Ht. centiles
0.036*	39.04±12.1	34.16±13.5	Wt (kg) (mean±SD)	
0.274	13 54.2% 11 45.8%	9 37.5% 15 62.5%	Average Below 3rd percentile	Wt. centiles
0.024*	20.84±3.71	19.06±4	BMI (kg/m^2)(mean±SD)	

Table (6): Laboratory parameters among the studied group before and after educational sessions

P-value (Mann-Whitney U Test)	After educational sessions n=30		Before educational sessions n=30		Lab parameters
	SD	Mean	SD	Mean	
0.03*	1.3	10.14	1.5	9.35	Hb (g/dl)
0.958	4.51	31.22	5.55	31.59	Haematocrit (%)
0.573	23.2	64.3	26.57	70.83	BUN(mg/dl)
0.544	2	8.50	1.88	8.70	Creatinine (mg/dl)
0.287	1.5	9.3	1.24	8.87	Ca (mg/dl)
0.282	1.49	4.98	1.51	4.58	P (mg/dl)
0.008**	1	4.0	0.93	3.30	Albumin (g/dl)
0.525	9 (30.0%)		11 (36.3%)		CRP Positive
	21 (70.0%)		19 (63.33%)		Negative

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دور التقييم الغذائى فى تحسين صحة الأطفال المصابين بالفشل الكلوى

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الملخص العربى

أجريت الدراسة على ٣٠ طفلاً ١٥ من الذكور و١٥من الإناث تتراوح أعمارهم بين ٦ سنوات و ١٨ سنة ، مصابين بالفشل الكلوى فى مراحله الأخيرة ، وكان جميع الأطفال يخضعون للغسيل الدموى ثلاث مرات في الأسبوع ، مع استمرار كل جلسة غسيل كلوي لمدة ثلاث إلى أربع ساعات. تم إجراء الغسيل للمرضى على ماكينة الغسيل الكلى (ماركة فريسينيوس ٤٠٠٨صناعة ألمانيا). أظهرت النتائج أن نسبة العيوب الخلقية فى الكلى بين المرضى كانت ٧أطفال بنسبة (٢٣,٣٣٪) ، وكانت نسبة تشوهات المسالك البولية ٨ أطفال بنسبة(٢٦,٦٦٪) ، وكانت نسبة أمراض الكبيبة ١٠أطفال بنسبة (٣٣,٣٣)، والنسبة المئوية لأسباب غير معروفة كانت ٥أطفال بنسبة (١٦,٦٦٪). وكانت متوسط المدة بين بداية اكتشاف الفشل الكلوى وبداية العلاج بالغسيل الدموى٤±١,٥سنة وكان متوسط مدة الغسيل الدموى٣,١٩±١,١٣سنة.كان هناك اختلاف في المتناول الغذائي في الأسبوع بين المرضى فيما يتعلق بالحبوب والحلويات والمصادر الحيوانية والمصادر النباتية والخضروات والفواكة. كذلك لوحظ زيادة كبيرة في متوسط الوزن للأطفال بعد الدورات التعليمية والتدخل الغذائي. كذلك كانت هناك زيادة غير كبيرة في متوسط طول المرضى بعد الجلسات التعليمية.بينما كانت هناك زيادة ذات دلالة إحصائية في مستوى الهيموجلوبين وفي مستوى الألبومين بالدم بعد الجلسات التعليمية، وزاد أيضا مستوىالكرياتينين و BUN للمرضى ، والتي كانت ٨,٧ ± ١,٨ ، ٧٠,٨٣ ± ٢٦,٥٧ ملجم / ديسيلتر على التوالي. كذلك لوحظ انخفاض في مستوى الكالسيوم في السيرم (٨,٨٧ ± ١,٢٤) ملجم / ديسيلتر وزيادة في مستوىالفوسفور عند الأطفال المرضى (٤,٥ ± ١,٥١) ملجم / ديسيلتر. وخلاصة القول، لوحظ أن الأهتمام بالمأخوذ الغذائى المتوازن وزيادة الجلسات التعليمية للأطفال وأهلهم أدى إلى تحسين حالات الأطفال المصابين بالفشل الكلوى.

الكلمات الأفتتاحية: الأطفال ـ الفشل الكلوى ـ التقييم الغذائى.