

## Effect of Nutritional Guidance on Parents' Awareness and Nutritional Status of Children Undergoing Hemodialysis

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### Abstract

**Background:** Chronic kidney disease is a progressive deterioration of kidney functions which associated with metabolism, fluids and electrolytes disturbances. In addition, impairment of growth and development. **Purpose:** it was to examine the effect of nutritional guidance on parents' awareness and nutritional status of children undergoing hemodialysis. A Quasi-experimental design was utilized. **Setting:** Pediatric Hemodialysis Unit, EL-Menoufia University Hospital in Shebein El-kom city. **Sample:** purposive sample of 30 children and their parents were included in the study. **Instruments for data collection:** three instruments were used, instrument one; A structured interview questionnaire developed by the investigators to collect data regarding the study consists of 2 parts: 1st part: socio demographic data of children, 2nd part: Parents' knowledge toward chronic kidney disease; instrument two was anthropometric measures and 24 hours dietary recall; instrument three was a structured interview questionnaire to assess parents awareness about nutritional requirements of their children. The **results** of this study showed that, more than half of children were under weight, around two thirds of children achieved normal weight on follow up test. The study **concluded** that implementation of nutritional guidance improved parents' awareness about adequate nutrition for their children and improved nutritional status of children undergoing hemodialysis on post and follow up tests than on pretest. **Therefore, it was recommended that** regular nutritional assessment of children should be maintained throughout their hemodialysis period and nurses should provide nutritional education for their mothers.

**Keywords:** Parent awareness, Hemodialysis, Nutrition of children, Nutritional Guidance.

### Introduction:

Chronic kidney disease (CKD) is evidence of structural or functional kidney abnormalities such as abnormal urine analysis, imaging studies, or histology that persist for at least 3 months, with or without decreasing of glomerular filtration rate (GFR), less than 60 ml/minute/1.73 m<sup>2</sup> (Webster et al., 2017).

End stage renal disease (ESRD) is total loss of kidney function, it is a common problem worldwide. The number of children with chronic kidney disease is about 18.5-58.3 per million children worldwide (Gulati, 2015). It occurs when a disease or condition impairs kidney function, causing kidney damage to

worsen over several months or years. This includes; diabetes mellitus, hypertension, obstructed urine flow, kidney diseases, kidney artery stenosis, certain toxins, fetal developmental problem, systemic lupus erythromatosis, over use of some medications such as non-steroidal anti-inflammatory drugs (NSAIDs) and kidneys injury (Kolvek, 2017).

The most common complications of chronic renal failure (CRF) are anemia, hypertension and cardiovascular problems, anorexia, vomiting and poor appetite. Also, taste sensation is reduced early in the course of CRF and worsens as CRF progresses, growth

retardation, mal- development of neuro-cognitive skills (Armstrong et al, 2010).

Growth impairment is a common and perhaps the most visible complication of CKD in children. The degree of growth impairment increases as glomerular filtration rate declines, even though a significant decrease in growth was seen at all levels of kidney dysfunction (Roding et al., 2014).

Malnutrition is recognized to be a serious and common complication of chronic kidney disease (CKD) and is associated with increased morbidity and mortality (Wingen & Mehls, 2011). Short stature is one of the major complications that caused as a consequence of CKD. The degree of renal dysfunction correlates with the degree of growth failure and children with CKD on continuous dialysis have the most profound growth delay. It is estimated that one quarter to one third of children on dialysis are below the normal range for height (Norman, Coleman and Macdonald, 2000).

Anemia is one of most common complications of CKD. Forty five percent of children with CKD were found to be anemic (Mikhail, Brown and Williams, 2017). Hemoglobin target of 11-12 g/dl and transferrin saturation >20% is recommended by National Kidney Foundation (2015). Pediatric patients on dialysis require additional parenteral and enteral iron to maintain stores (Warady, Schaefer and Alexander, 2012).

Treatment of chronic kidney disease includes hemodialysis, peritoneal dialysis, or a kidney transplant. Hemodialysis uses a machine to filter the blood outside the body, in peritoneal dialysis specific fluid is placed into the abdominal cavity and then drained, with this process being repeated multiple times per day. Kidney transplantation involves surgically placing a kidney from someone else (National Institute of Diabetes and Digestive and Kidney Diseases, 2017).

Management of chronic kidney disease in children is not only to prevent progression to end stage renal disease but to fulfill the

physiological and emotional needs of children to the best possible quality of life. Also, treatment should maintain normal growth and development (Sajid et al., 2018).

Nutrition play an important role in improving growth of children with CKD, it is important for slowing down the deterioration of renal function. High calorie intake is needed for optimal growth. (Wingen and Mehls, 2011).

Patients' with CKD need to control intake of eight important nutrients: calories, protein, sodium, phosphorous, calcium, potassium, vitamins and minerals. They also need to control their fluid intake to control weight and body swelling (Masoudi, Fouly and Hassan, 2012).

The nutritional requirements for children with CKD have been extensively reviewed elsewhere (Rees, 2011). Detailed guidelines are available on all aspects of management settings. The energy requirements of children with CKD do not differ from those of healthy children, but protein requirements may be higher than normal in children on dialysis, as protein and amino acids are lost in the dialysate during the dialysis sessions. A low-protein diet is not recommended for children with CKD as it may compromise growth, and no evidence exists to indicate that a low-protein diet attenuates the progression of CKD in children (Chaturvedi and Jones 2012).

Nurses are the main link between pediatric hemodialysis unit and parents. So, they must have different skills that equipped them to communicate and cooperate with parents who help in the prevention of social, physical and psychological problems to their children as early as possible (Gray and Draibe, 2015).

Children undergoing hemodialysis require specialized nursing care, including establishment of a therapeutic and interpersonal relationship, treatment of physical symptoms and attention to the functional limitations, mental disorders and educational needs of those patients (Stavropoulou, et al, 2017). Basically,

nurses are the main health care provider who provide care for these children and the most important responsibility of them is to identify the essential care of those children (Vafaei, Fouly and Hassan, 2017).

Parents of children with CKD are the main corner stone of care and directly dealing with the health care centers, social and community services (Bayoumi, 2013). Health education programs should be provided to parents to improve the nutritional status of their children who are undergoing hemodialysis .More-ever, there is an intense need to raise awareness of all parents. Therefore, this study will provide adequate information about optimal nutrition that should be offered to their children who are suffering from chronic renal failure and undergoing hemodialysis (Hassona, 2015).

### **Significance of the study**

Chronic kidney disease (CKD) is a progressive deterioration of kidney function in which the body metabolism, water and electrolyte balance have been disturbed resulting in uremia. More than 90,000 children die annually worldwide due to renal failure (Gulati, 2015).

In Egypt, the estimated annual incidence of end stage renal disease (ESRD) is around 74/million and the total prevalence of children on dialysis is 264/million (El-Arbagy et al., 2016). Also, the incidence of chronic renal failure among pediatric patients on hemodialysis is around 15 per million a year (Ministry of Health and Population, 2015). As Chronic kidney disease (CKD) affect growth and development of children, there is an intense need to provide nutritional guidance for parents regarding optimal nutrition for their children to achieve optimal level of growth and development.

### **Purpose of the study**

The purpose of the current study was to examine the effect of nutritional guidance on parents' awareness and nutritional status of children undergoing hemodialysis.

### **Research Hypothesis**

The following research hypotheses are formulated to achieve the purpose of the study:

1. Parents' awareness about optimal nutrition of their children undergoing hemodialysis will be improved after receiving nutritional guidance on posttest than on pretest.
2. Children nutritional status will be improved after implementing nutritional guidance on posttest than on pretest.

### **Methods**

#### **Research Design:**

A Quasi- experimental design was used (pre and posttest).

#### **Research Setting:**

This study was conducted in the Pediatric Hemodialysis Unit, at EL-Menoufia University Hospital in Shebein El-Kom city, Menoufia Governorate.

#### **Sampling:-**

Purposive sample of 30 children undergoing hemodialysis and their parents in Menoufia University Hospital, it considered the only unite in Menoufia governorate for pediatric hemodialysis. The sample consists of 30 children at the time of conducting the study. All of children participated met inclusion criteria.

#### **Inclusion criteria**

- Children with chronic renal failure and undergoing hemodialysis.
- Children aged from 4-18 years old.

#### **Exclusion criteria**

- Children with other health problems associated with CKD.
- Previously attending nutritional program for dialysis patients or having nutritional regimen.

**Data collection instruments:** three instruments were utilized.

**Instrument (1): A structured interview questionnaire was used for data collection.**

### Part one:-Biosocial characteristics of children and their parents: -

Such as child's age, gender, residence, family number, educational level, parents' age, gender, job, marital status and socio economic level.

**Part two: - Parents' knowledge toward kidney disease of their children on hemodialysis:** it was developed by the researchers guided by Ajarmeh et al., (2018) .

It contains definition of chronic renal failure, causes of CRF, lines of treatment of renal failure and definition of hemodialysis.

#### ❖ Scoring system:-

The scoring system of parents' knowledge toward end stage renal disease of their children on hemodialysis consists of complete answer= grade (2), incomplete answer = grade (1) and do not know = grade (0). While, total score consists of unsatisfactory level (less than 60%), moderate satisfaction (60-75%) and satisfactory level (more than 75%).

**Instrument (2): Nutritional assessment instrument for children.** It consists of two parts:

**Part one: Anthropometric measures** (weight and height) of each child involved in the study and then calculate the body mass index (BMI) of each child.

#### Weight:

Was measured with the patient bare-footed, jackets and extra clothes took off. The apparatus was the spring scale, made in Germany, placed on a hard, flat floor. Weight was measured to the nearest half kilogram.

#### Height:

Was measured while the patient was standing bare- feet. The head forward and his eyes in the center. The height was measured using a standard tape fixed vertically on the wall. The patients were instructed to tightly touch the wall at the four points are the point of

the head, shoulders, buttocks, and heel. Height was measured in centimeters to the nearest half centimeter.

#### Body mass index (BMI):

Defined as the body weight divided by the square of the body height, and then categorize that person as underweight, normal weight, overweight, or obese based on that value.

#### BMI Classification for Children (2-18) Years Old

Weight Classification	BMI for Age Percentiles
Underweight	<5th
Healthy Weight	5th to <85th
Overweight	85th to <95th
Obese	≥95th

#### Part two: 24 Hours Dietary Recall

Nutrition elements during 24 hours recall of dietary intake for 3 days to every child was assessed. 24 hour dietary recall method consists of precisely recalling, quantifying, and describing the intake of beverages and food consumed, it should describe the type of food and its characteristics, the quantity consumed, method of preparation, commercial brands, liquids, and food supplements, as well as the time and place of consumption. The information is collected via an open predetermined questionnaire. software programs are used to translate reported dietary intakes into variables of interest. after coding the foods and supplements reported on a 24-hour dietary recall and food record, creates a file that includes food code and an amount consumed for each food and drinks reported for each child for data processing. Coding system, and computer software that allows for the conversion of collected information into data that can be utilized in statistical programs which analysis nutrients into macronutrient and micronutrient.

#### Instrument (3): Parent's awareness about nutritional requirements: -

It developed by the researchers after review of the related literature to assess parents' awareness about nutritional requirements for their children who are undergoing hemodialysis

sessions. It contains questions about children's diet, fluids intake, dietary regimen for hemodialysis, optimal nutritional guidelines for their children and manifestations of malnutrition.

#### ❖ Scoring system:-

The scoring system of parent's awareness about nutritional requirements consists of complete answer = grade (2), incomplete answer = grade (1) and don't know= grade (0). While total score consists of un satisfactory level (less than 60%), moderate satisfactory level (60-75%) and satisfactory level (more than 75%).

#### Validity:

To assess validity of the study instruments, three instruments were submitted to a jury of five experts in the pediatric field (four professors in pediatric Nursing and one professor in nutrition and food science). The modifications were done to ascertain their relevance and completeness.

#### Reliability:

The reliability of the study instruments was tested to determine the extent to which items in the tools were related to each other by Cronbach's co-efficiency Alpha ( $\alpha = 0.97$ ). Pearson correlation co-efficiency was done to test the internal consistency ( $r=0.98$ ) of all items of the tools.

#### Ethical considerations

- An approval from ethical research committee of the Faculty of Nursing, Menoufia University was obtained.
- An official permission from the Dean of the Faculty of Nursing to the director of hemodialysis unit after explaining the purpose, outcome of the study and the method of data collection was obtained by the researchers.
- Informed consent was obtained from parents included in the study. An initial interview was conducted with parents to inform them about the purpose and benefits of the study. Also, they were told that study is voluntary, harmless and they can withdraw from the study at any time.

- Parents assured that confidentiality and anonymity were respected through coding system for all data and put it in a closed cabinet.

#### Pilot study

The pilot study was carried out on three parents (10% of the sample) and 3 children to test study tools in terms of its clarity, applicability and time required to fulfill all the study tools and also to assess the feasibility of the study tools. The sample of the pilot study was excluded from total sample to ensure stability of results.

#### Procedure:

1- Parents who have fulfilled the inclusion criteria were invited to participate in the study and the aim of the study was explained to each child and their parents to gain their cooperation to share in the study.

#### Data collection:

Data collection was conducted for a period of 6 months starting from the 1st of September 2019 to the end of November 2020.

The researchers introduced herself and explained the purpose, nature of the study and overall objective of nutritional guidance to the parents and their children.

#### 1- (Assessment phase):

- Assessing social characteristic of studied children.
- Assessing parent's knowledge about their children disease as definition of renal failure, causes of renal failure, its treatment and definition of hemodialysis.
- Anthropometric measures (weight and height) of each child were measured.
- Assessing 24 hours dietary intakes of the children for three days through asking mothers or fathers about what child have eaten in the past three days.
- Assessing parents' awareness about nutritional requirements of their children undergoing hemodialysis.

## 2- (Implementation phase): Implementing the nutritional guidance

- Parents divided into six groups; each group include five mothers. They received about 4 sessions within 4 weeks (1 sessions per week). Each session lasted for 30 minutes.
- Nutritional guidance was planned, designed, and implemented for parents of children undergoing hemodialysis guided by dietitian professors.
- **Session 1:** Parents received brief explanations about renal disease, anatomy and function of the kidneys, definition, causes and types of renal failure. Also, parents received brief explanations about causes, signs and symptoms of chronic renal failure, different methods of treatment of renal failure, definition, and importance of hemodialysis.
- **Session 2:** Parents received general information about appropriate nutrition for renal disease, importance of following nutritional guidance for their children, importance of protein and types of food rich in protein. In addition parents received brief explanations about harmful effects of sodium in case of renal failure, sources of food that should be avoided because they are high in sodium and other alternatives that may be used safely. And how mother can control the amount of sodium in some food resources.
- **Session 3:** pictures were used to illustrate the types of food and fluids that contain high amount of phosphates, these types that should be avoided or used with limitations. Also, researchers explained to parents of children sources of calcium, the relation between calcium and phosphate.
- **Session 4:** An explanation about harmful effects of increasing potassium amount in blood as this affects the cardiac functions. Pictures were used to illustrate food that contains low, moderate and high percentage of potassium. An explanation was provided about how to overcome percentage of

potassium in some vegetables and the correct method for cooking these vegetables to get rid of potassium. Also, researchers have explained how mothers calculate the suitable amount of fluid needed for their children during 24 hours. Illustrating some things that can be done to reduce child sense of thirst especially during summer to avoid over hydration. Oral presentation, discussion and booklet were used.

- Posttest was done after three months of implementing nutritional guidance by using the previous instruments used at pretest.
- Follow up test was done after six months by using the previous instruments.

### Statistical Analysis:

- Data was coded and transformed into specially designed form to be suitable for computer entry process. Data was entered and analyzed by using SPSS (Statistical Package for Social Science) statistical package version 20. Graphics were done using Excel program.
- Quantitative data was expressed as mean & standard deviation ( $X \pm SD$ ) and analyzed by using t-test for comparison between means.
- Qualitative data was expressed in the form of number and percentage (No. & %). It was analyzed by using Fried -man test for values which not normally distributed and Anova test for qualitative values which normally distributed.

### Results:

**Table (1):** showed distribution of social characteristics of studied children. As indicated in this table, 50% of the studied children were aged from 11-14 years.

Studied children gender. As indicated in the figure, 56.7% of studied children were girls.

**Table (2):** Shows parent's knowledge about kidney disease on pre, post and follow-up period. As indicated in this table 73.3% of parents' knowledge were unsatisfactory on

pretest, while 100% of parents have satisfactory level of knowledge on post and follow up period. Also, there were highly statistically

satisfactory awareness on posttest. Also, this table showed a highly statistically significance differences between mean total score of parents' awareness on pre, post and follow up tests.

Significance differences between pre, post and follow up period at level of P-value equal 0.001 regarding parents' knowledge.

**Table (5):** Shows that body mass index of children undergoing hemodialysis on pre, post and follow up period. It indicated that 63.3% of children were underweight on pretest, then on posttest 50% of children achieved their normal weight and 66.7% of them achieved their normal weight on follow up period.

**Table (3):** Shows mean differences of 24 hours dietary recall for studied children on hemodialysis on pre, post and follow up period. The table illustrated that there was marked increase in level of calories, protein, fat and carbohydrates 1205.53±98.18, 54.30±16.69, 52.77 ±15.60, 126.13 ±42.41 on the pretest compared to 1308.53 ±107.24, 58.04±18.46, 59.79 ± 15.36, 148.072 ±84.17 on post interventions and 1658.63±126.39,65.67 ±27.65, 84.07 ±14.23, 216.76 ±100.48 on follow up intervention respectively. This finding illustrated the mean statistically significance increase in amount of calories, protein, CHO and fat taken by children in their diet.

**Figure (2):** Shows correlation between Parents' awareness about nutritional requirements and children weight. This finding reflected that there was a positive correlation between parent's awareness about nutritional requirements for their children and the weight of children on hemodialysis.

**Table (4):** Shows parents' awareness about nutritional requirements for their children on hemodialysis on pre, post and follow-up. It indicated that 80% of parents have moderate awareness on pretest and 66.7% of parent have

**Table (6):** Shows correlation between parents' awareness about nutritional requirements and macro nutrients. This finding illustrated that there was a positive correlation between parents' awareness about nutritional requirements and amount of calories, protein, fat and carbohydrates provided for children in their meals.

**Table (1):** Distribution of social characteristics of studied children.

Item	No (n=30)	%
Age :		
≤ 6 years	4	13.3
6- <10 years	5	16.7
10- <14 years	15	50
14-18 years	6	20

**Figure (1):** Distribution of studied children gender.

**Table (2):** Parent's knowledge about kidney diseases on pre, post and follow-up period.

Items	Pre		Post		Follow-up		χ <sup>2</sup> 1 P1-value	χ <sup>2</sup> 2 P2-value
	n=30	%	n=30	%	n=30	%		



<b>Unsatisfactory knowledge</b>	22	73.3	0	0.0	0	0.0	43.19 <sup>(HS)</sup>	.000 <sup>ns</sup>
<b>Satisfactory knowledge</b>	8	26.7	30	100.0	30	100.0	.000	1.000
<b>(Mean ± SD)</b>	2.60 ±1.52		7.13 ± 0.68		6.60 ± 0.563		A nova test 178.30 <sup>(HS)</sup>	0.000

Note:  $\chi^2_1$  & P1: Pre and post intervention.  $\chi^2_2$  & P2: differences between post and follow-up intervention.  
ns= not significant ( $p>0.05$ ) <sup>(HS)</sup>=( $p<0.001$ )

**Table (3):** Mean differences of 24 Hours Dietary Recall of macronutrients for studied children on hemodialysis on pre, post and follow-up period.

Items	Pre (Mean ± SD)	Post (Mean ± SD)	Follow-up (Mean ± SD)	Friedman test	P value
<b>Water</b>	717.16 ±21.3	570.23 ±120.54	560.70 ±96.41	10.005 <sup>(HS)</sup>	.000
<b>Calories</b>	1205.53 ±98.18	1308.53 ±107.24	1658.63 ±126.39	8.028 <sup>(HS)</sup>	.001
<b>Protein</b>	54.30 ±16.69	58.04 ±18.46	65.67 ±27.65	2.183 <sup>(S)</sup>	.119
<b>Fat</b>	52.77 ±15.60	59.79 ± 15.36	84.07 ±14.23	1.038 <sup>(S)</sup>	.358
<b>CHO</b>	126.13 ±42.41	148.072 ±84.17	216.76 ±100.48	12.137 <sup>(HS)</sup>	.000
<b>Fiber</b>	5.96 ±4.24	4.59 ±3.20	4.26 ±1.94	2.275 <sup>(S)</sup>	.109

ns= not significant ( $p>0.05$ ) <sup>(S)</sup> = ( $p<0.05$ ) <sup>(HS)</sup>=( $p<0.001$ )

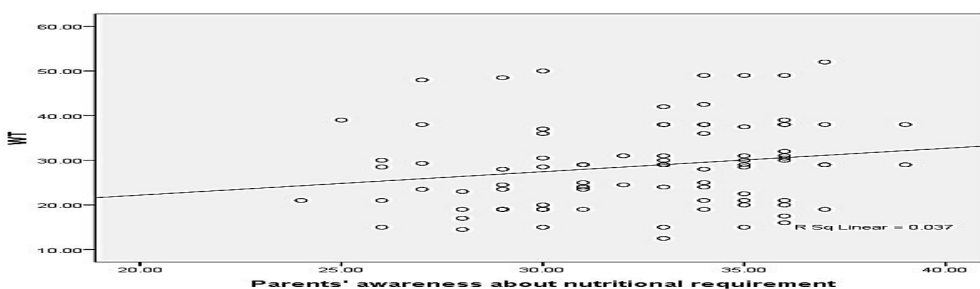
**Table (4):** Parents' awareness about nutritional requirements for their children on hemodialysis on pre, post and follow-up period.

Items	Pre		Post		Follow-up		$\chi^2_1$ P1-value	$\chi^2_2$ P2-value
	n=30	%	n=30	%	n=30	%		
<b>Unsatisfactory awareness</b>	6	20.0	0	0.0	0	0.0	32.16 <sup>(HS)</sup>	0.073 <sup>ns</sup>
<b>Moderate awareness</b>	24	80.0	10	33.3	11	36.7	0.000	0.787
<b>Satisfactory awareness</b>	0	0.0	20	66.7	19	63.3		
<b>(Mean ± SD)</b>	28.46 ±2.92		34.50 ± 2.06		33.96 ±2.68		A nova test 71.728 <sup>(HS)</sup>	.000

Note:  $\chi^2_1$  & P1: differences between pre and post intervention.  
 $\chi^2_2$  & P2: differences between post and follow-up intervention.  
ns= not significant ( $p>0.05$ ) <sup>(HS)</sup>=( $p<0.001$ )

**Table (5):** Body mass index of children undergoing hemodialysis on pre, post and follow up period.

Items	Pre		Post		Follow-up		Friedman test	P value
	n=30	%	n=30	%	n=30.	%		
<b>Under weight</b>	19	63.3	15	50.0	10	33.3		
<b>Normal weight</b>	11	36.7	15	50.0	20	66.7		
<b>Mean BMI</b>	17.95 ±4.51		19.24 ±3.81		21.45 ± 5.3		4.441 <sup>(S)</sup>	.015





**Figure (2):** Correlation between Parents' awareness about nutritional requirements and children weight.

**Table (6):** Correlation between Parents' awareness about nutritional requirements and Macro nutrients.

Items	Parents' awareness about nutritional requirements	
	r	P value
Water	-.373**	.000
Calories	.396**	.000
Protein	.266*	.011
Fat	.050	.637
CHO	.425**	.000
Fiber	-.192-	.069

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

### Discussion:

Chronic kidney disease (CKD) involves irreversible loss of renal function to the extent that the kidneys are unable to meet the metabolic demands of the body. Typically, CRF progresses gradually over a period of months or years and is associated with a variety of complications including water and electrolyte imbalance, metabolic acidosis, and anemia, bone disease, malnutrition and growth failure (National Nutrition Institute, 2016).

Growth impairment is a common and perhaps the most visible complication of CKD in children. The degree of growth impairment increases as glomerular filtration rate declines, even though a significant decrease in growth was seen at all levels of kidney dysfunction (Roding, Dermott & Schneider, 2014).

The purpose of this study was to examine the effect of nutritional guidance on parents' awareness and nutritional status of children undergoing hemodialysis.

In the current study, it was showed that half of children undergoing hemodialysis their age ranged from 11-14 years . This result was partially agreed with Azad Tehrani,(2020) who conducted a study about "Assessment of nutritional status of children with Chronic Renal Failure Undergoing Hemodialysis", and reported that the age of children ranged from 10-13 years (66.7%).

Concerning the children gender, it was observed that girls were more affected than boys. This study agreed with Mahmoud (2010) who conducted a study about "Needs assessment of children undergoing hemodialysis therapy" as well as Abd El-Tawab (2010) who conducted a research about "Factors affecting quality of life for adolescent undergoing hemodialysis" who reported that more than half of children with hemodialysis were girls. However, this result was in contrast with El-Sayed (2012) who conducted a study about "Effect of nursing intervention on the QOL of children undergoing hemodialysis" The study mentioned that chronic renal failure was much higher among boys than girls.

**In relation to hypothesis one: Parents' awareness about optimal nutrition of their children undergoing hemodialysis will be improved after receiving nutritional guidance on posttest than on pretest.**

Concerning parent's knowledge about end stage renal disease. The current study illustrated that the majority of parents have unsatisfactory knowledge on pretest. Meanwhile, all parents have satisfactory knowledge on post and follow up tests. From the researchers point of view, this can be interpreted as parents didn't take any previous educational programs about renal disease. Also, due to the effectiveness of nutritional guidance on improving parents' knowledge about renal disease. This result came in line with Nygardh (2011) who carried out a

study about "Empowerment in outpatient care for children with chronic kidney disease". The study reported that parents have little knowledge about the disease as well as they were limited in their ability to support their children. Also, this result was on the same line with Hanaa, et al (2019). As they founded that we must update knowledge and practices of parents of children with chronic disease to improve their knowledge and practices which prevent exposure to crisis and prevent occurring complications of chronic disease

The present study illustrated that parents' awareness about optimal nutrition of their children undergoing hemodialysis was improved after receiving nutritional guidance on posttest than on pretest. The current study revealed that the largest percentage of parents have moderate satisfactory level of awareness on pretest. However, after implementing the nutritional guidance, more than two thirds of parents have satisfactory awareness. From the researchers' point of view, this can be rationalized as the nutritional guidance was effective in improving parent's nutritional awareness.

This result was supported by Nygardh et. al., (2011) who carried out a study about "Empowerment in outpatient care for patients with chronic kidney disease from the family members perspective". And they reported that parents have poor knowledge about the disease as well as they were limited in their ability to support their children.

In addition, the finding was agreed with Ajarmeh (2018) in her study about " Jordanian Parents' Knowledge and Attitudes Regarding Kidney Disease in Children" As she revealed that parents have poor knowledge about kidney disease in children especially in terms of disease complications, optimal nutrition and she recommended that more parental education is needed on these topics. Greater awareness of childhood kidney disease is required for early diagnosis, better management, and improved family care, nutritional management and adherence to treatment.

Meanwhile, this result is consistent with Nightingale et. al., (2014) in their study about "Using focused ethnography in pediatric settings to explore professionals and parents attitudes towards expertise in managing chronic kidney disease ", As they found that parents develop their own knowledge gained overtime from their contact with the expertise that they developed their skills regarding condition management.

In addition, Gorojkok et. al., (2016) in his study about " Online Support Program for Parents of Children with a Chronic Kidney Disease Using Intervention Mapping". Their study revealed that the program can create a unique and promising online support program for parents of children with CKD in the Netherlands. It improves parent's awareness about care of their children with CKD in all life dimensions.

Another study of Al-Shookri, et al (2011) about "Effect of Mothers Nutritional Knowledge and Attitudes on Omani Children's Dietary Intake". Who showed that more than half of parents knowledge was incorrect on pretest. But after providing program, there was a positive relationship between children's dietary food intake and mothers' nutritional knowledge and attitude scores. From the researchers point of view, this can be rationalized as nutritional knowledge related to dietary intake highlight the fact that nutrition related education and information provided for mothers can improve dietary intake of their children.

**In relation to hypothesis two: Children nutritional status will be improved after implementing nutritional guidance on posttest than on pretest.**

Regarding anthropometric measurements, the current study showed that about two thirds of children suffering from underweight on pretest. From the researchers point of view, this could be due to parents didn't take any previous educational sessions about the balanced diet for their children. Such result agreed with Tawfik, (2016). who conducted

study about " Nutritional Educational Sessions in Children with Chronic Renal Failure on Regular Hemodialysis " who founded that more than half of children undergoing hemodialysis were under weight. In addition, this finding was in line with Youssef, et al. (2015) who conducted a study about "Nutritional Knowledge Following Interventional Educational Sessions in Children on regular hemodialysis" .They reported that more than two thirds of children with chronic kidney disease were below normal weight.

Meanwhile, after implementing nutritional guidance, there was a significant increase in the mean body weight of children on post and follow up tests. From the researchers point of view, this could be due to the positive effect of nutritional guidance provided to parents throughout this study. This result agreed with Tawfik, (2016). who found an increase in mean body weight of children.

However, this result was disagreed with Youssef, et al (2015) finding, who reported that there was no significant increase in the mean body weight of children with chronic kidney disease after providing educational sessions.

According to body mass index (BMI), the current study founded that there was a decrease in the mean BMI of children before intervention. From the researchers point of view, this can be rationalized as, the chronic kidney disease lead to impairment of children growth and development. This result was in line with Tawfik, (2016). result of her study as she reported that there was a decrease in the mean of BMI on pretest. However, after nutritional guidance sessions, there was a significant increase in the mean BMI of children on post and follow up intervention ( $19.24 \pm 3.81$ ) and to ( $21.45 \pm 5.3$ ) kg/m<sup>2</sup> respectively. This finding was agreed with El-shafie et. al., (2009) who conducted a study about "Diet modifications for patients on regular hemodialysis", they found that after nutritional interventions, there was an increase in the mean of BMI as it increased on posttest.

Concerning the 24 hours dietary intake of macro nutrients, the finding of the current study revealed that the majority of children received low amount of protein, fat and energy. From the researchers point of view, this can be due to lack of parents' awareness about daily nutritional requirements of their children and excessive protein intake should be avoided in children on dialysis to prevent metabolic acidosis. This result was in contrast with Zaki et al., (2012) who conducted a study about "Nutritional Status in Children with Chronic Renal Failure on Hemodialysis". They found that 96.7% of Egyptian children undergoing hemodialysis received adequate protein intake.

In addition, the findings of the current study revealed that there were a decrease in the mean of protein, fat and calories on pretest versus increased on posttest and follow up test. This can be interpreted as nutritional guidance was effective in improving parents' awareness about daily requirements of macronutrients for their children undergoing hemodialysis. This finding agreed with Azad Tehrani,(2020) in her study about" Assessment of Nutrition Status of Children with Chronic Renal Failure Undergoing Hemodialysis", as she reported that the majority of children received low amount of protein, fat and energy. This usually continued during maintenance dialysis therapy and may lead to development of protein–calorie malnutrition.

Also, this result was in line with Zioni (2012) who conducted study about "Improving the nutritional condition of infant and young children undergoing hemodialysis". He reported that the parents should receive guidance regarding the composition of the daily menu and weekly follow-up of adequate nutrition of their children undergoing hemodialysis. In addition, children undergoing hemodialysis therapy require a diet with significantly high calories and protein amount for building tissues. So it was extremely important that the dietician provide constant guidance to parents to improve nutritional status and growth of children receiving hemodialysis.

In addition, Goldstein et. al., (2002) conducted a study about "Assessment and intradialytic parenteral nutrition treatment of malnutrition in pediatric hemodialysis patients". They reported that increased caloric and protein intake for children on dialysis was needed to improve nutritional status of children receiving HD.

Regarding correlation between parents' awareness and anthropometric measures, the results of the current study revealed that there was a positive correlation between parents' awareness about nutritional requirements and their children weight. This result agreed with Tawfik, (2016). as she pointed that after providing her educational program about nutrition for children undergoing hemodialysis, there was a positive correlation between weight of children and their nutritional knowledge. As the weight was improved after implementing the educational program.

The present study reflected that there was a positive correlation between parent' awareness about nutritional requirements and macro nutrients of calories, protein, fat and carbohydrates. From the researchers' point of view, this can be rationalized as the improvement of parents awareness about nutritional requirements of their children leads to increase amount of protein, fat and carbohydrates intake in their diet. This result agreed with Zaki,et al(2012) in her study about " Nutritional status in children with chronic renal failure on hemodialysis ".Her result reflected a positive correlation between macro nutrient intake and score of weight and body mass index.

### **Conclusion:**

The present study concluded that the implementation of nutritional guidance improved parents awareness about adequate nutrition for their children and also improved nutritional status of children undergoing hemodialysis on post and follow-up tests than on pretest.

### **Recommendations:**

Based on the previous findings and research hypothesis, the following recommendations are suggested:

#### **Recommendations for parents:-**

1. Simple nutritional guidelines for parents of children undergoing hemodialysis should be available at all hemodialysis units to all admitted children.
2. Ongoing nutritional guidance for parents of children undergoing hemodialysis should be provided at least monthly to enhance their knowledge regarding optimal nutrition of their children.

#### **Recommendations for children:-**

- a- Regular assessment of nutritional status of children through measuring their weight and height.
- b- Regular follow up of BMI of children for early detection of malnutrition and manage the problem.

#### **Recommendations for Research:-**

1. Application of the present study on a large sample size and for a long period of time to ensure the generalization of the results.
2. Further studies are needed to determine the effect of nutritional guidance on nutritional status of children undergoing hemodialysis in different settings.

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