Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 4, Issue 3, pp: (170-182), Month: September - December 2017, Available at: www.noveltyjournals.com

Effect of Nutritional Program on Health Parameters of Children with Chronic Kidney Disease

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Abstract: **Chronic renal failure is defined as the inability of the kidneys to do their function. Child with renal failure undergoing hemodialysis therapy requires diet modification. Aim of the study was to determine the effect of nutrition program on health parameters of children with chronic kidney disease. Materials and method, the study was carried out at Nephrology Unit of Tanta University Hospital. The study involved 50 children and their mothers. Two tools was used to collect data, tool I: questionnaire sheet designed by the researcher to assess the child's knowledge and their mother about, renal failure, hemodailysis therapy ,nutritional status, feeding habits, feeding problems and physical activity level. Tool II: Nutritional assessment sheet include physical, physiological assessment sheet, anthropometric measurement, laboratory investigation and daily dietary intake. The main results revealed that there were statistical significant differences in relation to mother s' knowledge and their children throughout the three phases. Most of studied children were suffered from a lot of feeding problem and growth retardation. Conclusion: The program has a positive effect on children knowledge and their mother. Recommendation: Educational programs for children undergoing hemodialysis therapy to provide them with essential knowledge about the disease and its management. Continues counseling should be established on healthy dietary choices and nutritional follow-up at each visit.**

Keywords: **Nutritional program, Health parameters, chronic kidney disease.**

1. INTRODUCTION

Nutrition is the most environmental factor affecting health. It is necessary to sustain life, especially for children during the period of rapid growth and development. Good nutrition helps in preventing acute and chronic illness as renal failure (CRF). The nutritional needs of a child with renal failure are very different from those healthy. Due to chemical imbalances, the child's tastes may be altered which causing a decrease in oral intake [(1)].

The kidneys play an important role in a child's growth, and to remove wastes and extra fluid from the blood, the kidneys produce hormones that promote red blood cell production. It helps regulate the amounts and interactions of nutrients from food, including minerals like calciumand phosphorus, that are necessary for growth. Meanwhile, the kidneys also play a role in the metabolism of growth hormone, also called somatotropin[(2)].

A child with chronic kidney disease requires diet modifications by discontinuing the use of some foods and adjusting the amount of others. In order to meet these goals, the nutritional management should include restriction of proteins, adjustment of intake or absorption of minerals and electrolytes such as sodium, potassium and phosphorus, provision of sufficient energy intake, avoidance of potentially harmful intake of phosphorus, magnesium, aluminum, vitamin A and D and replacement of deficient hormones, including erythropoietin and calcitionin[(2)].

In the pediatric population age 19 and under the annual rate are 1 or 2 new cases in every 100,000 children. In other words, adults are about 20 times more likely to develop kidney failure than children, where the risk increases steadily with age .In Egypt, the exact prevalence of renal failure is unknown, but it remain associated with significant morbidity and mortality in children[(3)].

There are two types of renal failure: acute renal failure is characterized by the abrupt failure of the kidneys to regulate water and electrolyte homeostasis. Acute renal failure in childhood due to uremic syndrome, post infectious acute glomerulonephritis, or dehydration are reversible, but a small percentage may progress to chronic renal failure[(4)].

Chronic renal failure is the result of slowly progressive kidney diseases and seldom is fully reversible. This condition in childhood is associated with obstructive uropathy, congenital a plastic/ hypoplastic / hysplastic kidneys, and other causes. In chronic renal failure, almost every system of the body such as cardiovascular system and GIT system [(5)].

Renal failure can lead directly to more health problems, like swelling of the body, bone deformities, and growth failure. A successful kidney transplant can give a child with chronic renal failure the best chance to grow normally and lead a full, active life. Dialysis can help a child to survive an acute episode of kidney failure or to stay healthy until a donated kidney becomes available[(7)].

Medical management in pediatric patients can include peritoneal dialysis and hemodailysis. The nutritional management of chronic kidney disease (CKD) is designed to maintain blood urea nitrogen (BUN) within acceptable ranges; regulate sodium, potassium and phosphorus levels; regulate fluid balance and prevent the wasting and malnutrition often associated with CKD. Specific nutrient recommendations depend on the degree and type of renal failure, clinical symptoms and treatment modalities. Hence, the nutritional state of children undergoing haemodailysis therapy should be assessed [(6)].

Hemodialysis therapy is the most common method used to treat advanced and permanent kidney failure. Dialysis does not treat renal failure, but instead keeps a person alive by performing the crucial functions of the kidneys. Hemodialysis is still a complicated and inconvenient therapy that requires a coordinated effort from whole health care team, including nephrologists, dialysis nurse, dialysis technician, dietitian, and social worker. The most important members of health care team are family. By learning about treatment, the child and their family can work with health care team to give possible result [(8)].

Nurses role of preventing malnutrition for children undergoing haemodailysis therapy that causing loss of lean body mass, through educating these children about healthy diet and follow up care, controlling symptoms, preventing complication, good observation of the physical state of these children, explain renal failure in terms that the children can understand, stressing the fact that it is a chronic disease and that adherence to treatment plan is necessary in order to delay or prevent complications and encourage children to participate in prescribed care[(9)].

The nurses, role as change agents help the child and his family to understand the nature of the disease. Often the child and family are in a state of crisis when renal failure occurs. This state of crisis can limit the child's ability to learn and retain information. So, during this initial period, it is important to include the family in all teaching, which helps them understand what and why particular therapies are used. When the patient is able to learn and understand more about his chronic renal failure, the family can be valuable in reinforcing teaching [(10)].

Significance of the problem was observed at the Hemodialysis Pediatric Unties in Tanta University Hospital that children a have lack of knowledge regarding good nutrition result in dangerous complication as that children high risk for growth failure and malnutrition. So it is important to conduct this study to evaluate the effect of nutritional status on health parameters of children suffering from renal failure and children undergoing hemodialysis therapy.

Aim of the study was to determine the effect of nutritional program on health parameters of children with chronic kidney disease.

Research hypothesis: The present study was hypothesized that health parameters of children with chronic kidney disease improved post nutritional program.

Operational definition:

Health parameters: Quantifiable physical characteristic of individual which used to describe one or more aspects of individual health (quality, quantity and time) and indicate change over time in level of health as (BMI, weight, blood pressure, body temperature, heart rate).

2. MATERIALS AND METHOD

Materials:

Research design:

A quasi-experimental research design was used:

Setting: This study was conducted at Nephrology Unit of Tanta University Hospital.

Subjects: A convenient sample of fifty children and their mother undergoing hemodialysis therapy at the previously mentioned setting with the following inclusion criteria: children from both gender, their ages ranged between 6-18 years diagnosis of end stage renal disease and undergoing hemodialysis therapy. Exclusion criteria: children suffering from any other chronic diseases that affect the child nutritional status.

Two tools were used to collect the required data:

Tool I: Structured interview questionnaire schedule: It was constructed in simple Arabic language by the researcher after reviewing the relevant literature. It included the following parts:

Part I: Socio demographic characteristic of the children

a) Characteristics of the studied children namely: age, gender, birth order, education level, residence

b) -Socio demographic characteristics of the mother: age, educational level family income.

Part II: Knowledge of children and their mother related to definition, cause, manifestation, and management of chronic kidney disease, definition of hemodialysis and indication of hemodialysis.

Part III: a-Feeding habits of child: Number of meal per day, likes and dislikes, child feeding pattern and state of appetite before and after hemodialysis snacks between meals, feeding practice, forbidden food and Fluid intake /day. b- Feeding problem**:** Presence of problems type of problems such as(nausea, vomiting, loss of appetite, difficulty in chewing and swallowing food, dryness of mouth), problem affection on having food and time of occurrence sign.

Part IV: Physical activity level of the child: Categories of activity, suitable time for exercise precaution to avoid its effect on general condition.

Tool II Nutritional assessment sheets: It was included the following:

Part I: a) Physical assessment sheet of chronic renal failure which included observation for general condition from head to toes includes face, eyes, lips, hair, gums, skin, and any gastrointestinal tract problems.

b) Physiological measurement as measuring vital sign: temperature, pulse, respiration, blood pressure.

Part II: Anthropometric measurement and laboratory investigation

a- Anthropometric measurement which included height, weight, upper mid arm circumference and skin fold thickness, Body Mass Index. Each measurement was taken according to standard recommended by World Health Organization [(11)].

b- Laboratory- investigationsuch as complete blood count, hemoglobin, hematocrit, blood urea, total serum protein, sodium and potassium the results was compared with normal range of the corresponding age group.

Part III: Daily dietary intake to estimate the caloric intake by using 24 hour recall method. Asking the mother and their child about food consumed for at least 24 hours ,period in portion size, mild obtained for the three major meals (breakfast, lunch and dinner) in detains to any food articles consumed between (snakes) or during night Peterson(2011) [(12)]

Method:

1-Permission was obtained to conduct this study from head of nephrology units at Tanta University Hospital.

2-Tools were developed by the researcher for data collection after a review of past and current literature, local and international related literature using books, articles and magazines.

3- Ethical considerations: The study subjects was assured that all the gathered data was treated confidentially and was used for the research purpose only. In addition, those children were informed that they have the right to withdraw from the study without giving any reason.

4-A pilot study was carried out, including 10% of children to test the feasibility, clarity, content validity and objectivity of the study tools and accordingly the necessary modifications were done in the form of adding or omission of some questions. Modifications were done to the questionnaire.

5-Each child with his mother was interviewed individually to obtain the required data about socio-demographic data of children and their mother, feeding habits, feeding problem, physical activity level ,physiological measurement of the children and measurement anthropometric measurement and laboratory investigation were taken from the hospital reports.

6 - Observation check list was used to observe child complete physical examination to assess physical state of the child by observe the child from the head to the toes.

7- Each child was observed from head to toe to assess his or her nutritional status.

8- Phases of the study: The study was conducted on three phases:

The implementation Phase was included the following steps:

Assessment phase: An interview was conducted to collect the baseline data about children' knowledge related to Chronic renal failure and hemodialysis. Areas of weakness in children' knowledge were identified and protocol objectives were set as follows.

Each child attended the following sessions:

1- The First Session: - It was covering the following topics definition chronic renal failure. By the end of first session child and his mother were able to define chronic renal failure

2- The Second Session:- It began with a review of the concepts previously presented and progress to the next level which was focused on Causes of chronic renal failure. By the end of second session child and his mother were able to identify chronic renal failure

3- The Third Session :- It was concentrated on manifestations and management of chronic renal failure. By the end of second session child and his mother were able to enumerate chronic renal failure

4- The Fourth Session:- It began with reviewing the points previously instructed and demonstrating about feeding habits of child suffering chronic renal failure.

5- The Fifth Session: It was focused on demonstrating food consumption of child suffering chronic renal failure**.**

6- The Sixth Session: It was concentrated on Food consumption of child suffering chronic renal failure undergoing hemodialysis therapy.

Evaluation Phase:

Evaluation had been done before, immediately and after three month from the implementation of the guidelines.

Novelty Journals

ISSN 2394-7330

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Statistical Analysis:

Data collected from the studied sample was revised, coded and entered using PC. Computerized data entry and statistical analysis were fulfilled using the statistical package for social sciences (SPSS) version 18. Data were presented using descriptive statistics in the form of frequencies, percentages. Chi-square test (X^2) was used for comparison between qualitative variables. Significant was considered at P value <0.05 and P<0.01 for interpretation of results of tests of significance.

3. RESULTS

Table (1): Percentage distribution of the studied children according to their biosociodemographic characteristics**.** It showed that the mean age of the studied children was 12.020 ± 3.67 year. As regarded the children's sex, more than half (56%) of them were females. According to their educational status, it reflected that, less than half (38%) of the studied children were illiterate.

Table (2): Percentage distribution of children and their mother knowledge regarding chronic renal failure. It was found that 54% of the children and their mother didn't know definition of chronic renal failure, after program implementation this percentage improved to 26% and 46% for both immediately and after 3 months respectively. Regarding the symptoms of chronic renal failure. It revealed that 6% of the children and their mother only know the manifestation of chronic kidney disease before receiving the health instruction and this percentage improved to 48% immediately and after the instruction . Concerning children knowledge and their mother about management of CRF it was found that 46% of the children knew incomplete answer before the program and after 3 months only 10% of the children and their mother did not know children' knowledge regarding hemodialysis .

Table (3): Percentage distribution of the studied children regarding their feeding habits .It illustrated that, there was highly statistically significant difference between pre and post-program implementation in relation to distribution of the studied children regarding their children's feeding habits. It was found that, nearly half 44% of the studied children had two meals /day at initial contact and increased to74% after implementation and 66% after three months. The difference was statistically significant. On the other hand more than two third of children 68% ate family food and nearly one third of them 32% ate special food at initial contact.

Table (4): Percentage distribution of the studied children regarding their Feeding Problems. It was observed that ,the majority of the studied children about 86% had feeding problems while76% and 66% of the studied children had feeding problems immediately post and after 3 months of health instruction respective There were significant differences. More than one third 40% children had loss of appetite , while (20%, 12%, 6%, 6%,16%) of them respectively had nausea, vomiting, dryness of mouth, teeth carries, difficulty of chewing and swallowing, diminished in food taste at initial contact.

Table (5) : Percentage distribution of the studied children regarding physical assessment. It was revealed that there was no change in percentage through pre and post program .All children had normal skull throughout program phases. while 64%, of them had normal hair ,while 36% of them suffering from hair fall through pre phases Regarding to teeth, half of them50% of the studied children had normal teeth at initial contact and increased to 60% after 3 months Regarding gum, about one third of the studied children 38% had normal gum of at initial contact and decreased to 50% after 3 months. 22%& 24%had bleeding, swelling, inflammation and at initial contact. After 3 months (50%, of them had normal gum. There were significant differences .

Table (6): Percentage distribution of the studied children regarding anthropometric measurement . It was found that more than three quarters (78%) were considered underweight (<90%) at initial contact. On the other hand, seventy percent (70%) were considered underweight after 3 months. Concerning the height, 24% of the studied children were considered normal tall (90-110%) and (76%) of them were stunted (90%) at initial contact and there was no change. There were no significant differences. Regarding Body Mass Index , it was noticed that the majority of children (82%) were underweight. The difference was statistically significant.

Table (8) : Percentage distribution of the studied children regarding their adequacy of dietary intake. It was clear that, the 60%of the studied children consumed adequate carbohydrate at initial contact and there was no change after 3 months to

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 4, Issue 3, pp: (170-182), Month: September - December 2017, Available at: www.noveltyjournals.com

60%. More than two third 68%was consuming less protein than RDA and dropped to 16% immediate post program, and after 3 months. Statistically, there were significant differences.

Table (9) : Percentage distribution of the studied children regarding their adequacy of mineral and vitamins intake. It was clear that, less than half of the studied children 46% consumed less calcium than RDA_s at initial contact .Statistically, there were significant differences.

Table (1): Percentage distribution of the studied children according to their sociodemographic characteristics (n=50)

Characteristics of the studied children	No.	%
Age in years		
6>9	10	20.0
9>12	7	14.0
12>15	30	30.0
15≥18	18	36.0
$\overline{X}$ ± SD 12.020 ± 3.67		
Gender		
Male	22	44.0
Female	28	56.0
Education level		
Illiterate or read and write	19	38.0
Primary education	17	34.0
preparatory	8	16.0
secondary	6	12.0
Rank of child in the family		
First	8	16.0
Second	11	22.0
Third	20	40.0
Fourth or more	11	22.0
Residence		
Rural	24	48.0
Urban	26	52.0
Water supply		
Present	50	100.0
Sanitary water disposable (sewage)		
Present	39	78.0
Not present	11	22.0

Table (2): Percentage distribution of children and their mother knowledge regarding chronic renal failure (n=50)

Mothers' knowledge	Preprogram						Immediate post program						Follow up after three month						X2 (1)*	P Value	X2 (2)**	P value	X2 (3)***	P value
	Correct and complete		Correct and incomplete		Don't know		Correct and complete		Correct and incomplete		Don't know		Correct and complete		Correct and incomplete		Don't know							
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%						
Definition	0	0.0	23	46.0	27	54.0	13	26.0	15	30.0	2	4.0	23	46.0	22	44.0	5	10.0	0.320	0.572	29.080	0.000**	12.280	0.000**
Causes	1	2.0	24	48.0	25	50.0	33	66.0	15	30.0	2	4.0	17	34.0	20	40.0	13	26.0	22.120	0.000**	30.00	0.000**	1.480	0.000**
Symptoms	3	6.0	20	40.0	27	54.0	24	48.0	21	42.0	5	10.0	20	40.0	21	42.0	9	18.0	17.5	0.000**	12.52	0.000**	5.320	0.000**
Management	3	6.0	23	46.0	24	48.0	31	62.0	16	32.0	3	6.0	30	60.0	5	10.0	5	10.0	18.21	0.000**	23.26	0.000**	23.080	0.000**
Definition of hemodialysis	5	10.0	20	40.0	25	50.0	30	60.0	18	36.0	2	4.0	16	32.0	21	42.0	13	26.0	16.84	0.000**	23.680	0.000**	19.600	0.000**
Indication of hemodialysis	4	8.0	18	36.0	28	56.0	29	58.0	20	40.0	1	2.0	22	44.0	16	32.0	12	24.0	13.000	0.000*8	24.520	0.000**	3.04	0.000**

***Pre and immediate post program.**

**** Pre-program and follow up assessment.**

***** Immediate post program and follow up.**

*** Statistically significant difference at P<0.05**

Novelty Journals

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Table (3): Percentage distribution of the studied children regarding their feeding habits (n=50).

Children Feeding Pattern	Preprogram		Immediate post program		Follow up after three month		X2 (1)*	P Value	X2 (2) **	P value	X2 (3)***	P value
	No	%	No	%	No	%						
Number of meals / day												
One meal	4	8.0	0	0.0	0	0.0	7.210	0.001**	11.250	.01	5.120	0.024
Two meal	22	44.0	37	74.0	33	66.0						
Three meal	24	48.0	13	26.0	17	34.0						
Major meal												
Breakfast	20	40.0	25	50.0	22	44.0						
Lunch	23	46.0	25	50.0	22	44.0	8.235	0.001**	6.456	.01	5.879	0.067
dinner	7	14.0	0	0.0	8	16.0						
Food preferred												
All food												
Fruits and vegetable	8	16.0	9	18.0	16	32.0						
Sweats	12	24.0	30	60.0	21	42.0	28.005	0.000**	30.520	0.000**	16.480	0.000**
	30	60.0	6	12.0	13	26.0						
Snacks between meals							25.90	0.000**	59.08	0.000**	43.27	.240
Eating snacks	13	26.0	13	26.0	20	40.0						
Not eating snacks	37	74.0	37	74.0	30	60.0						
Feeding Practice												
Eating family's food	34	68.0	41	82.0	40	80.0	16.02	0.000**	19.001	0.000**	27.07	0.000**
Eating special food	16	32.0	9	18.0	10	20.0						
Forbidden food							18.00	0.000**	22.020	0.000**	19.70	0.000**
Yes	15	30.0	32	64.0	29	58.0						
No	35	70.0	23	46.0	21	42.0						
Fluid intake / day												
Three cup/ day	3	6.0	20	40.0	15	30.0	17.500	0.00**	22.120	0.00**	19.820	0.00**
Five cups/ day	21	42.0	27	54.0	25	50.0						
As needed	26	32.0	3	6.0	10	20.0						
State of Appetite												
Good Appetite	12	24.0	12	24.0	9	18.0	9.543	0.01*	9.543	0.01*	7.876	0.001**
Poor appetite	38	76.0	38	76.0	41	82.0						
Change of appetite							9.543	0.01*	7.876	0.001**	7.876	0.001**
Not changed	12	24.0	9	18.0	9	18.0						
Got worse	38	76.0	41	82.0	41	82.0						

*** Statistically significant difference at P<0.05**

Table (4): Percentage distribution of the studied children regarding their Feeding Problems(n=50).

Children Feeding Problem	preprogram		Immediate post program		Follow up after three month		X2 (1) *	P Value	X2 (2) **	P value	X2 (3) ***	P value
	No	%	No	%	No	%						
Presence of Problems :												
Yes	43	86.0	39	78.0	33	66.0	25.920	0.000**	27.080	0.0001	5.120	0.024
No	7	14.0	11	22.0	17	34.0						
Type of Problems												
Loss of Appetite	20	40.0	20	40.0	18	36.0						
Nausea and vomiting	10	20.0	10	20.0	5	10.0						
Dryness of mouth	6	12.0	3	6.0	6	12.0	26.480	0.000**	26.470	0.000**	27.280	0.000*
Teeth carries	3	6.0	3	6.0	3	6.0						
Difficulty in Chewing	3	6.0	3	6.0	8	16.0						
Diminished in Food Taste	8	16.0	11	22.0	10	20.0						
Problem affection on having food												
Yes	43	86.0	43	86.0	33	66.0	25.920	0.000**	27.080	0.000**	4.210	.240
No	7	14.0	6	14.0	17	34.0						
Time of occurrence sign												0.0001
All time	9	18.0	9	18.0	2	4.0						
Before Hemodialysis	12	24.0	12	24.0	15	30.0	18.620	0.000**	18.620	0.000**	80.00	
After Hemodialysis	5	10.0	5	10.0	13	26.0						
During Hemodialysis	24	48.0	24	48.0	20	40.0						

*** Statistically significant difference at P<0.05**

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ISSN 2394-7330

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Table (5): Percentage distribution of the studied children regarding physical assessment (n=50).

Physical Assessment	Preprogram		Immediate post program		Follow up after three month		X2 (1) *	P Value	X2 (2) **	P value	X2 (3) ***	P value
	No	%	No	%	No	%						
Skull												
Normal	50	100.0	50	100.0	50	100.0	0	0.000**	0	0.000**	0	0.000**
Hair distribution												
Normal	32	64.0	32	64.0	36	72.0	3.920	0.048	3.920	0.0480	4.892	0.040
Hair fall	18	36.0	18	32.0	14	28.0						
Teeth												
Normal	25	50.0	25	50.0	30	60.0	5.120	.024	5.120	.024	6.001	.005
Caries	15	30.0	15	30.0	10	20.0						
Broken	10	20.0	10	20.0	10	20.0						
Gum												
Normal pink	19	38.0	19	38.0	25	50.0	2.669	.005	2.669	.005	1.766	0.001**
Red in colure	8	16.0	8	16.0	8	16.0						
Inflammation swelling	12	24.0	12	24.0	5	10.0						
Bleeding	11	22.0	11	22.0	12	24.0						
Eye Lids												
Normal	30	60.0	20	40.0	25	50.0	18.000	0.000***	18.000	0.001**	3.920	0.0001***
Redness	20	40.0	30	60.0	25	50.0						
Edema	30	60.0	30	60.0	19	38.0						
Skin colure												
Normal	15	30.0	15	30.0	17	34.0	6.480	0.011	6.480	0.011	9.68	.002
Yellow	10	20.0	10	20.0	12	24.0						
Pale	15	30.0	15	30.0	11	22.0						
Skin appearance												
Moist	20	40.0	20	40.0	25	50.0	7.720	0.001**	7.720	0.001**	10.654	.004
Dry	30	60.0	30	60.0	25	50.0						
Neck												
Normal	33	66.0	33	66.0	29	58.0	2.000	.157	2.000	.157	1.008	0.01*
Congestion vein	17	34.0	17	34.0	21	42.0						
Bowel movement												
Normal	12	24.0	15	30.0	17	34.0	13.000	0.000***	35.320	0.000***	5.120	5.120
Abdominal distention Diarrhea	15	30.0	14	28.0	25	50.0						
Constipation	5	10.0	7	14.0	6	12.0						
	18	36.0	16	23.0	7	14.0						
Abdominal distention												
Present	22	44.0	33	66.0	25	50.0	5.987	0.001**	9.567	0.001**	10.654	0.001**
Absent	23	46.0	22	44.0	25	50.0						
Both Extremities												
Edema	12	24.0	14	28.0	15	30.0	13.520	0.000***	35.320	0.000***	30.200	0.001**
Pain and swelling joint	15	30.0	14	28.0	25	50.0						
Imbalanced in walking	5	10.0	6	12.0	4	8.0						
Muscle cramps	18	36.0	16	32.0	6	12.0						

*** Statistically significant difference at P<0.05**

Table (6): Percentage distribution of the studied children regarding anthropometric measurement(n=50).

Anthropometric Measurement	preprogram		Immediate post program		Follow up after three month		X2 (1)*	P Value	X2 (2)**	P value	X2 (3)) ***	P value
	No	%	No	%	No	%						
Weight												
90-110%	11	22.0	11	22.0	15	30.0	15.680	0.001**	15.680	0.001	16.330	0.098
<90%	39	78.0	39	78.0	35	70.0						
Height												
90-110%	12	24.0	12	24.0	12	24.0	0.000	.001**	11.00	1.000	13.03	0.000***
<90%	38	76.0	38	76.0	38	76.0						
Mid arm Circumference												
90-110%	6	12.0	6	12.0	9	18.0	13.880	0.000***	13.880	0.000***	29.270	0.001**
<90%	44	88.0	44	88.0	41	82.0						
Skin fold Thickness												
80-110%	6	12	6	12.0	10	20.0	28.880	0.001**	28.880	0.001**	29.626	0.009
<80%	44	88.0	44	88.0	40	80.0						
Standard Body mass Underweight	41	82.0	41	82.0	38	76.0	26.140	0.000**	26.140	0.000**	18.006	0.0001***
<18.5	9	18.0	9	18.0	12	24.0						
Normal 18.5-22.5												

*** Statistically significant difference at P<0.05**

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 4, Issue 3, pp: (170-182), Month: September - December 2017, Available at: www.noveltyjournals.com

Table (7): Percentage distribution of the studied children regarding their adequacy of dietary intake (n=50).

Dietary Intake	Preprogram		Immediate post program		Follow up after three month		X2 (1) *	P Value	X2 (2) **	P value	X2 (3)) ***	P Value
	No	%	No	%	No	%						
Carbohydrate												
Adequate	30	60.0	45	90.0	30	60.0	31.210	0.001 **	36.010	0.0001 ***	29.000	0.001 **
Less than RDA$_s$	10	20.0	5	10.0	10	20.0						
More than RDA$_s$	10	20.0	0	0.0	10	20.0						
Protein												
Adequate	10	20.0	32	64.0	10	20.0	28.43	0.0001 ***	33.43	0.0001	28.42	0.0001 ***
Less than RDA$_s$	34	68.0	8	16.0	34	78.0						
More than RDA$_s$	6	12.0	10	10.0	6	12.5						
Fat												
Adequate	15	30.0	20	40.0	28	56.0	25.45	0.001 **	32.54	0.001 **	30.23	0.001 **
Less than RDA$_s$	15	30.0	22	44.0	12	24.0						
More than RDA$_s$	20	40.0	8	16.0	10	20.0						

* **Statistically significant difference at P<0.05**

Table (8): Percentage distribution of the studied children regarding their adequacy of dietary mineral and vitamins intake **(n=50).**

Dietary Intake	Preprogram		Immediate Post Program		Follow Up After Three Month		X2 (1) *	P Value	X2 (2) **	P value	X2 (3)) ***	P Value
	No	%	No	%	No	%						
Calcium Adequate	22	44.0	30	60.0	22	44.0	23.09	0.01 *	25.67	0.01 *	23.09	0.01 *
Less than RDA$_s$	23	46.0	12	24.0	23	46.0						
More than RDA$_s$	3	6.0	8	16.0	3	6.0						
Sodium												
Adequate	15	30.0	30	60.0	45	90.0	33.06	0.01 *	25.67	0.01 *	36.010	0.0001 ***
Less than RDA$_s$	16	32.0	12	24.0	5	10.0						
More than RDA$_s$	19	38.0	8	16.0	0	0.0						
Iron												
Adequate	30	60,0	35	70.0	25	50.0	23.12	0.001 **	36.08	0.0001 ***	33.27	0.001 **
Less than RDA$_s$	20	40.0	15	30.0	25	50.0						
Vitamin A												
Adequate	16	32.0	21	42..0	18	36.0	29.62	0.01 *	34.22	0.001 **	32.00	0.001 **
Less than RDA$_s$	25	50.0	25	50.0	30	60.0						
More than RDA$_s$	9	18.0	4	8.0	2	4.0						
Vitamin C												
Adequate	5	10.0	38	76.0	30	60.0	36.012	0.01 *	38.982	0.0001 ***	36.542	0.0001 ***
Less than RDA$_s$	45	90.0	12	24.0	20	40.0						

*** Statistically significant difference at P<0.05**

4. DISCUSSION

Chronic renal failure is considered one of the most common health problems all over the world. However, chronic renal failure is a significant burden, not only on health but also on lowering productivity and reducing participation in family life. Chronic renal failure is a condition in which the kidney ceases to remove metabolic wastes and excessive water from the blood and then progress to end-stage renal disease**.** The progressive loss of renal function in children with CRF leads to metabolic abnormalities which exert a negative influence on their nutritional status and stature growth [(13,14)].

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As regards characteristics of the studied children, the results of the current study revealed that more than half of the studied children were females. This may be due to shortage in the urethra of female leading to increase incidence of infection. The findings of the current was disagreement with the study conducted byFramuman (2015) who stated that males have higher incidence rate to be affected with CRF among children from birth to 19 years than females . This may due to increase congenital malformation in males as obstructive uropathy that increase the risk of renal failure[(15))] .

The results of the current study revealed that more than one third of the studied children were illiterate. This may be due to suffering of child to go to school due to their chronic illness**.** This result was in an agreement with the results of the study done by Mohamed (2012) who found that, there was high level of illiteracy among children with chronic renal failure and undergoing hemodialysis therapy[(16).]

Regarding to children' knowledge this study showed that more than half of children and their mothers didn't know concept of renal failure before receiving health instruction. This could be attributed to the fact that mother did not receive any training program about chronic renal failure. This is supported by Daugirds (2011) who stated that most of the mother did not know the concept of renal failure. [(17)]

Before program instruction, The study showed that half of children and their mothers didn't know cause of renal failure this was in an agreement with the findings of the study done by Abed Ella (2013) who stated that two third of children and their mothers undergoing hadn't correct knowledge about causes of renal failure. USRDS (2009) who stated that most conmen cause of renal failure in children were genetic kidney disease. Moreover, Kyle (2011) stated that chronic renal failure in children most often results from congenital anomalies. [(18&19&20)]

According to management of renal failure in the present study less than half of the studied children did not know the management of renal failure before receiving the health instruction and significant improved occurred in their percentage immediately and after3 months This may be due to increase awareness about the nature of the disease, its causes and management after receiving the health instruction. This was in an agreement with the findings of the study done by Sharaf (2000) mentioned that three quarters of the studied sample did not know management of renal failure[(21)]

In addition in the present study showed that about two third of the children and their mother did not know the indication of hemodialysis before receiving the health instruction. This is supported by Daugirds(2011)who stated that hemodialysis is defined as the movement of solute and water from the patient's blood across semipermeable membrane (the Dialyzer) into the dialysate solution to filter the blood from toxic substance but most of children with CRF and their mother did not know that. This may be increase illiteracy rate among the studied mother and their children. [(17)]

In relation to feeding habits, the present study revealed that less than half of studied children had two meals/ day only on pretest stage. This may be due to loss of appetite and presence of other feeding problem related to disease. This result was in an accordance with Dainclski (2009) who stated that the child with chronic renal failure usually require progressive restriction of various dietary as their renal function declines. [(22)]

The present study revealed that about three quarters of the studied children didn't had snacks between meals. This may be due to loss of appetite, this was in disagreement with the results of study conducted by Jerny (2011)who stated that three quarters of the studied children had snacks between meals. [(23)]

In the present study, more than two third of children had family food, while one third of them had special food according to their health status on the pre-test. This may be due to lack of awareness of the mother about nutritional system of their children related to chronic disease. This was in contrast with Kloppen et al (2008) who stated that, the assessment of dietary intake become an important issue; the outcome hemodialysis depends on the adequacy of dialysis treatment and nutritional status of the child [(24)]

The present study revealed that more than two third of the studied children restrict fluid intake\day and about only one third of them had fluid intake/day as needed. That may be due to the restrictions of fluid according to their health states. That was in an agreement with Abed El- Ghany (2011) who studied the quality of dialysis in children under going hemodialysis therapy and their nutritional state and found that children had unsatisfactory amount of fluid / day. Burrel et al (2015) who stated that, thefluid balance is an integral component of hemodialysis treatment to prevent under and over hydration, both of which have significant effects on intradialytic morbidity and long-term cardiovascular complications[(25)]

According to feeding problem of the studied children the present study found that loss of appetite, nausea and vomiting, dryness of mouth, difficulty in chewing and dim inched in food tasting as feeding problem of children with chronic renal failure and under hemodialysis therapy were the most common problem. This may be due arise from the effect of renal failure and hemodialysis therapy on ability of the child to eat and swallow food. This finding is supported by Hockenburry and Wilson (2008) , who mentioned that children with chronic renal failure usually have these mentioned problem., nausea, vomiting, loss of appetite abdominal pain, as most common problem of children with chronic renal failure . [(26)]

The contributing factors other than nutrition shod be considered in the study such as physical examination, anthropometric measurement and laboratory investigation. Regarding p hysical assessment of the studied children. The results of the present study found that about one quarters of children exposed to gum bleeding, this may be due to heparin administration during hemodialysis set , this was in disagreement with Arieff (2011) who stated that the uremic children had an increased incidence of bleeding episodes caused by platelet dysfunction, heparin administration and thrombocytopenia included by platelet membrane interaction[(27)].

The results of the present study revealed that there was many physical change associated with dialysis. It was found that more than one third of children had congestion in neck veins; this may be due to disease. This is going with Zoccali et al (2000), who stated that most of children with chronic renal failure had congestion in neck vein. [(28)]

The present study revealed that about one quarters of the studied children had edema in both extremities. That may be due to the accumulation of fluid in the body due to CRF. That was in an agreement with El sead (2011) stated that fluid accumulation in the body of the child with renal leading to edema in the eye lid and lower limbs. [(29)]

Body weight is one of the most important measurements in assessing nutritional status and used to pre diet emerge expenditure. While Pafu(2000) who stated that although body weight is a simple measure with important prognostic value but abnormalities in water storage and body composition in critical ill child are oedematous So the measured weight don't reflect the real body cell mass[**(30)**] .

As regard to anthropometric measurement of the studied children, results of the present study reflected that, about more than three quarters suffering from decrease in body weight this is may be due to decrease of nutritional intake because feeding problem. This means that, most of children were suffering from growth retardation. This result is emphasized by results of Tom & Coworkers (2005), that support the fact of growth retardation among children with CRF and undergoing dialysis therapy. [(31)]

Regarding to height of the studied children, results of the present study reflected that, most of the studied children suffering from decrease in height. That was in an agreement with Judy (2007) who stated that growth in pediatric children undergoing regular HDT was particularly poor with progressive loss of final adult height which significantly affects their sense of well being and quality of life. **[(32)]**

Regarding to body mass index the present study revealed that most of children undergoing hemodialysis therapy were under weight. This may be due to malnutrition .This finding was in an accordance with by Tsuruoka & Spector (2010)who stated that, three quarters of children with chronic renal failure undergoing hemodialysis therapy were under weight.[(33)]

Regarding to adequacy of dietary intake, In the present study, the majority of the studied children did not consume adequate amount of energy day such as fats .This result was in agreement with Allman et al (2015) , who stated that, children should be encouraged to reduce their intake of saturated fat to reduce the risk of cardiovascular disease, which is the major cause of death in children with CRF and undergoing dialysis therapy. **[(34)]**

In considering in adequacy of nutrient consumed by child was related to many factor such as hospitalization and children. The factor hospitalization include governmental hospitalization with limited budget, absence of qualified dietetic and there is no nutritional assessment for child, the factor related to child include child disease and low socioeconomic slander Abed elnaby(2012) . [(35)]

The present study showed that more than two third of the studied children had less than RDAs of protein intake this may be due to alteration in taste. This result was in an agreement with Hakim & Lazarus ,(2005) *who* found that one third of children undergoing haemodialysis show evidence of moderate to severe protein caloric malnutrition. Meanwhile, the study finding reflected that most the studied children had iron intake less than daily dietary intake. This agrees with Shorecki et al(2011) , who stated that chronic anemia present in the majority of children of chronic renal failure. It is due to lack of consumption of iron and also due to the accumulation of waste products in their bodies which affect the protection of red blood cells and causes the anemia. **(36&37)**

5. CONCLUSION

In the light of the study findings it can be concluded that, most of the studied children and their mother were having poor level of knowledge score regards to chronic renal failure, hemodialysis therapy. Chronic kidney disease child who undergoing hemodialysis therapy had feeding problem throughout the study period such as loss of appetite, nausea, vomiting and impaired taste. Regarding to nutritional status, most of studied children were suffering from malnutrition. Regarding to health parameters the studied children had impaired growth and development.

6. RECOMMENDATIONS

In the light of findings of the current study the following recommendations are suggested**:**

1. Health education of children and their mother to improve their knowledge about chronic kidney disease, hemodialysis therapy and their nutritional status.

2. Planning dietary regimens for these children by using audiovisual material like pictures, photos, films and booklet.

3. Periodic meeting between physician, nurse and dietitian to discuss nutritional problem of the children and management.

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