

Assessment of Nutritional Needs for School Age Children with Chronic Renal Failure Undergoing Hemodialysis

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Abstract

Background: chronic kidney disease causes several changes in the body's functions in metabolizing nutrients. In children undergoing hemodialysis, there are specific nutritional challenges that require careful management. **Aim:** This study aimed to assess the knowledge of school age children undergoing HD about their nutritional needs. **Research Design:** A descriptive exploratory research design was utilized. **Setting:** This study was conducted at hemodialysis units affiliated to Al-Azhar University Hospitals. **Subject:** A purposive sample composed of 67 school age children undergoing HD. **Tools:** Two tools were used; **Tool (I):** Structured Interviewing Questionnaire. **Tool (II):** Nutritional Needs Assessment Scale for School Age Children Undergoing Hemodialysis. **Results:** Study revealed that less than three quarters of studied school age children had unsatisfactory knowledge about chronic renal failure and more than three quarter of them had unsatisfactory knowledge about nutritional needs. Also, less than two thirds of studied school age children had high nutritional needs. **Conclusion:** The majority of studied school age children undergoing HD had unsatisfactory level of total level of knowledge about their nutritional needs. Also there was statistically significant correlation between their total level of knowledge and their anthropometric measurement. In addition, there was statistically significant negative correlation between their total level of knowledge and total dietary needs. **Recommendations:** Regular nutritional assessment of children should be maintained throughout their hemodialysis period and conduct an application nutritional program for children to ensure proper nutrition.

Keywords: Nutrition needs, School age children, Hemodialysis.

Introduction

Chronic kidney disease is considered one of significant one public health problems worldwide. In developing countries, school age children with CKD face significant challenge due to limited healthcare resources and infrastructure. The mortality rate due to CKD is alarming high. Chronic kidney disease is characterized by glomerular filtration rate fall below less than (60 ml / minute / 1.73 m²) persisting for at least 6 month or the presence of kidney damage regardless of the filtration rate even if it's above (60 ml / minute / 1.73 m²) (McCulloch et al., 2021).

Hemodialysis is one of the medical treatments needed for school age children with chronic kidney disease. HD is used to perform the essential functions of the kidneys when they are no longer able to filter waste products and excess fluids from the blood effectively. Blood

is drawn from the children's body and passed through a dialysis machine equipped with a special filter, which removes toxins and excess fluid. The cleansed blood is then returned to the body (Fadem, 2023).

Treatment with hemodialysis helps school age children manage the symptoms of chronic kidney disease and prevent complications such as fluid overload and electrolyte imbalances. However, it also requires careful monitoring and adjustments to dietary and fluid intake to ensure optimal health and growth. (Ruidiaz-Gómez & Higuera-Gutiérrez, 2021) .

School age children undergoing hemodialysis are at risk for various deficiencies due to altered nutrient absorption and increased nutrient losses. Thus, a diet rich in essential vitamins and minerals, tailored to each child's specific needs, is vital. Collaboration with a

pediatric nephrologist and a dietitian is essential to develop a personalized nutrition plan that addresses these challenges, promotes overall health, and supports optimal growth and development (*Pace& Kirk 2021*).

Scientist recommended daily intake for specific nutrient to ensure optimal nutrition status of hemodialysis children. School age children undergoing hemodialysis have unique nutritional needs due to the effects of both their underlying kidney condition and the dialysis treatment itself. Hemodialysis, which helps to filter waste products from the blood when the kidneys are no longer able to perform this function, can lead to significant changes in a child's nutritional requirements (*Iseki, 2022*).

The primary goals of nutrition in this context are to ensure adequate growth and development, manage symptoms, and minimize complications associated with both CKD and dialysis. (*Parkire, 2023*).

A key aspect of managing nutritional needs in those school age children involves careful regulation of protein intake. often require higher protein intake to compensate for the loss of protein during the dialysis process. However, this must be balanced with the need to control phosphorus and potassium levels, which can be affected by excessive protein consumption. Additionally, maintaining adequate caloric intake is crucial to support normal growth and energy levels, as dialysis can increase metabolic demands (*Sahathevan et al., 2020*).

Nutritional status has a great influence on neurocognitive and sexual development of children beside the growth and development. Regular assessment of nutritional status and provision of suitable nutrition are key parts in the overall management of children with CKD. Nutritional management for children suffering from this pathology should be aimed at preventing malnutrition and meeting the children's micronutrients needs (*Hulst et al., 2022*).

Significance of the study

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. (*Al-Shammari et al., 2021*).

More than 90,000 children die annually worldwide due to renal failure Also, the incidence of chronic renal failure among pediatric patients on HD is around 15 per million a year (*Ali et al., 2020*).

The nutrition has a vital role in decreasing mortality and morbidity in children undergoing HD. The previous research has indicated that significant loss of essential nutrient (imbalance in nutrition) in children undergoing hemodialysis. The information available about nutritional needs and status of dialysis children in developing countries; including Egypt, is very little compared to the USA and Europe. There for this study was carried out to assess nutritional needs of children undergoing hemodialysis

AIM OF THE STUDY

The study aimed to assess the nutritional needs for school age children undergoing hemodialysis.

through the following:

- 1.Assess the knowledge of school age children undergoing hemodialysis about their nutritional needs.
- 2.Assess the nutritional status of school age children undergoing hemodialysis.
3. Assess the relation between knowledge of school age children undergoing hemodialysis and their nutritional status.

Research Questions:

- What is the knowledge of school age children undergoing hemodialysis about their nutritional needs?
- What is the nutritional status of school age children undergoing hemodialysis?
- Is there a relation between the knowledge of school age children undergoing hemodialysis and their nutritional status?

Subjects and Methods

This study was conducted under the following four main designs as the following:

- I- Technical Design
- II-Operational Design
- III-Administrative Design
- IV-Statistical Design

I- Technical Design:

Technical Design for this study included a description of the research design, setting, subjects, and tools of data collection.

Research setting:

The study was conducted in pediatric hemodialysis (HD) units at Al-Azhar University Hospitals (El-Sayed Galal -Al-Zahra and El-Houssine).

El-Sayed Galal Hospital located in Bab El-Shaaria, Pediatric HD present at 5th floor, consist of three units, each unit contain six beds.

Al-Zahra Hospital located in Abbasiya, Pediatric HD present at 3rd floor, consist of 2 units, each unit contain nine beds. El- Houssine pediatric hemodialysis (HD) units transport to El-Sayed Galal hospital a

Sampling:

A purposive sample was used in this study within the following inclusive criteria:

- Children undergoing HD
- children accepted to participate in the study.
- on maintenance hemodialysis for at least six months.
- Age ranged from (6 – 12) years old.

The sample size was composed of 67 children, and the sample size was calculated by using the sample size equation

$$\frac{N \times p(1-p)}{[N-1 \times (d2 \div Z2)] + P(1-P)}$$

Tools for data collection:

Two tools of this study were designed after reading related literature and taking experts' opinions, it was written in Arabic language.

Tool I: Structured Interviewing Questionnaire: Developed by the researcher after reviewing the relevant literature to collect the data required and it will be written in Arabic language and will be refilled by the researcher, it consist of three parts and entitled the following items:

✓ **Part I:** demographic characteristic of the studied children under study such as (age, gender, residence, educational stage, number of family members and ranking of the child, father's age/ years, mother's age/ years, father's educational level, mother's educational level, father's occupation, mother's occupation and family income).

✓ **Part II:** Child and Family History of HD such as (duration of hemodialysis, frequency of dialysis sessions /wk, duration of hours per session, suffer from other health problem, types of the health problem, family history for kidney failure, hereditary diseases in the family, types of hereditary diseases, child receive for any medication before kidney failure, child suffer from any kidney disease before kidney failure, types of the kidney disease, contagious relationship and degree of relationship).

✓ **Part III:** Knowledge Questionnaire for School Age Children Undergoing Hemodialysis: It was developed by the researchers guided by *Ajarmeh et al.,)2018)*. It contained two section:

First section: Knowledge of school age children undergoing hemodialysis regarding CRF.

Second section: Knowledge of school age children undergoing hemodialysis regarding nutritional needs.

✓ Scoring system:

The scoring system of knowledge for school age children undergoing hemodialysis toward chronic renal failure consisted of: complete answer = grade (2), incomplete answer = grade (1) and do not know = grade (0). While total score was (54) degree and consisted of:

- Unsatisfactory level (less than 60%) equal (0-32) score.

- Moderate satisfaction (60-75%) equal (33-40) score.

- Satisfactory level (more than 75%) equal (41-54) score.

Tool II: Nutritional Needs Assessment Scale for School Age Children Undergoing Hemodialysis. It was developed by the research after reviewing of related literatures *Aboagye et al., (2022)*. And contain three parts:

✓ **Part 1: Anthropometric measurements questionnaire:** It was used to assess nutritional status of hemodialysis children such as (height, weight before dialysis, body mass index.....etc.)

✓ **Part 2: laboratory investigation,** it was used to assess health status of HD children. The investigation such as sodium, potassium, phosphorus, calcium, create, urea,etc.)

✓ **Part 3: Dietary needs:** it will be used to assess dietary habits for each hemodialysis children such as (loss of appetite, avoidance of salty food, and avoidance over the counter drug ...etc.), 24 recall daily intake of food, meals and drinks.

Scoring system: The scoring system of dietary needs of children on hemodialysis consisted of 3 Likert scale, always = grade (3), Sometimes = grade (2) and never = grade (1). While, total score was (60) degree and consisted of:

- High nutritional need (less than 60%) equal (46-60) degree.

- Moderate nutritional need (60-75%) equal (36-45) degree.

- Low nutritional need (more than 75%) equal (20-35) degree.

Operational Design:

The Operational design included the preparatory phase, validity, reliability, ethical consideration, pilot study, and fieldwork.

Preparatory phase

An extensive review of recent, current, national and international related literature in

various aspects of the problems was done to design the study tools and to be acquainted with various aspects of the problems.

Content validity:

To achieve the criteria of trust worthiness of the tool of data collection in this study. Tools of data collection were tested for content validity by three expert's professors of Pediatric nursing in Ain-Shams university for clarity, relevance, comprehensiveness, simplicity, and applicability.

Reliability of tool:

The tool was measured to ensure that an assessment tool produces stable and consistent result overtimes. The reliability coefficient for the study tool was calculated using the correlation coefficient Cronbach's alpha test as: it was including the following:

Tool	No of questions	Cronbach's Alpha
Reliability for knowledge	27	0.849
Reliability for Dietary need	20	0.846

Pilot study:

The pilot study was carried out on 10% of the study subjects (7 children's) who were selected randomly, to test applicability of the tools and determine time needed to collect data. Based on pilot study findings no modifications were made. Pilot sample was included in the study sample.

Field Work:

The actual process of data collection was carried out in three months consequently the period from the beginning of February 2024 to the end of Arbil 2024. Data was collected from the school age children during hemodialysis session at hemodialysis unit, or other suitable place before starting session. Hospitals visited 2days\ week, these days was Sunday& Monday from 9 am to 1pm every week, and the time needed to fill out the tool was 40 minutes for every child. The researcher introduced herself to the children's and also explained the aim of the

study to all of them. Confidentiality for all collected information was strictly assured.

III- Administration Design:

A written letter should be issued from the faculty of nursing Ain Shams University. Approval should be obtained from the selected hospitals administration.

Ethical Considerations:

Ethical approval was obtained from the scientific ethical committee, Faculty of Nursing, - Ain Shams University, after submitting a proposal for the research and examining all papers by the concerned committee. Then the purpose and nature of the study were explained to the participants and formal consent were taken and informed that each study subject is free to withdraw at any time through the study without giving any reasons.

IV- Statistical Design:

Data collected from the studied sample was analyzed and tabulated using the Statistical Package for Social Science (SPSS) version 28. Quantitative data was presented as numbers and percentages. The statistical tests used the chi-square test, means, standard deviation, and Correlation test which showed good internal consistency construct validity.

Results:

Table (1): Shows that, less than two thirds (61.2%) of the studied school age children were aged 10-12 years old with the mean age of (10.09±1.685) years. Also, less than two thirds (64.2 %) of the studied school age children were male. Regarding residence most (91.0%) of the studied school age children were lived in urban area. Moreover, less than one quarter (23.9% & 22.4%) of the studied school age children were at the third and fifth stage respectively. Regarding number of family member less than two thirds (62.7%) of the studied school age children had 4-6 family members. Concerning, ranking more than one third (37.3%) of the studied school age children were the third child in the family.

Table 2: Reveals that, less than three quarter (74.6%) of studied school age children had unsatisfactory knowledge about chronic

renal failure and more than three quarter (76.1%) of them had unsatisfactory knowledge about nutritional needs.

Figure (1): Illustrates, that more than three quarters (79.1%) of studied school age children undergoing hemodialysis had unsatisfactory level, while only (9.0 %) of them had satisfactory level of total knowledge about their nutritional needs.

Figure (2): Show that, less than two thirds (65.7%) of studied school age children undergoing hemodialysis had high nutritional needs, while (13.4%) of them had low nutritional need.

Table (3) Reveals that, there were statistically significant difference between total school age children' level of knowledge and age, residence, educational stage, number of family member and ranking of the child ($p \leq 0.05$).

Table (4): Shows that, there were statistically significant difference between total school age children' level of nutritional need and their gender, residence, educational stage and number of family member ($p \leq 0.05$)

Table (5): Reveals, that there was statistically significant strong negative correlation between total knowledge and total dietary needs for school age children undergoing hemodialysis ($p \leq 0.05$)

Table (6): show that that there was statistically significant weak correlation between total knowledge and anthropometric measurement for school age children undergoing hemodialysis ($p \leq 0.05$)

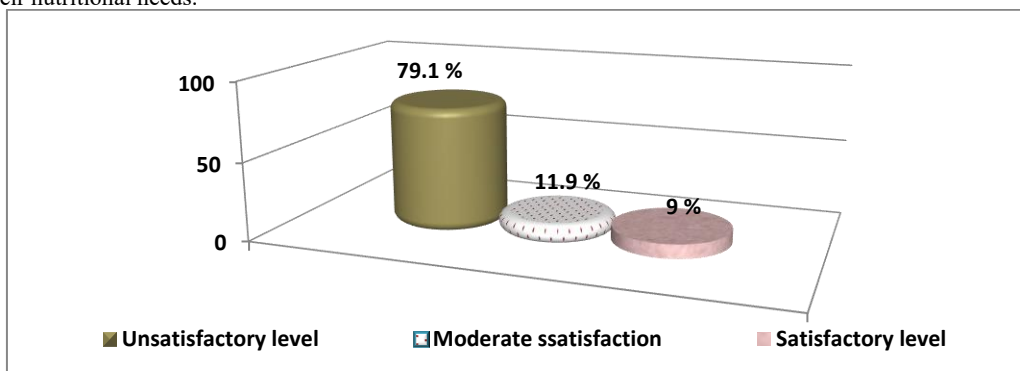
Table (7): show that that there wasn't statistically significance Correlation between total knowledge and 24-hour dietary intake for school age children undergoing hemodialysis ($p \leq 0.05$)

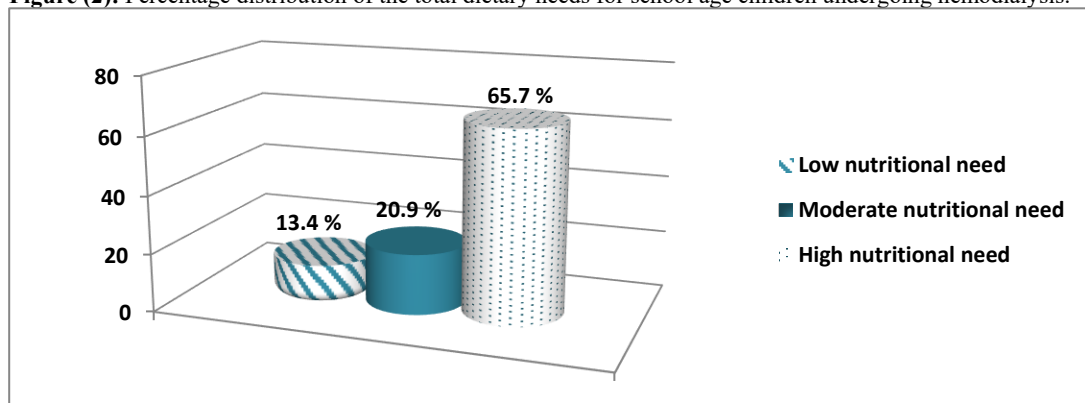
Part I: Demographic characteristic of the school age children.**Table (1):** Distribution of the school age children according to their demographic characteristic (n=67).

Demographic characteristic	No.	%
Age/ years		
6<8	2	3.0
8<10	24	35.8
10≤12	41	61.2
Mean ±SD	10.09±1.685	
Gender		
Male	43	64.2
Female	24	35.8
Residence		
Rural	6	9.0
Urban	61	91.0
Educational stage		
No enrolled	12	17.9
The first grade	2	3.0
The second grade	4	6.0
The third grade	16	23.9
The fourth grade	6	9.0
The fifth grade	15	22.4
The six grade	12	17.9
family members		
4-6	42	62.7
>6	25	37.3
Ranking of the child		
The first	12	17,9
The second	12	17.9
The third	25	37.3
The fourth	12	17.9
The fifth	6	9.0

Part II: Table (2): Total knowledge of the school age children**Table (2):** Distribution of the school age children regarding their total knowledge parts (n=67).

Items	Unsatisfactory		Moderate satisfaction		Satisfactory		Range	Mean ±SD
	No.	%	No.	%	No.	%		
Chronic renal failure	50	74.6	10	14.9	7	10.5	0-26	13.55±3.426
Nutritional needs	51	76.1	11	16.4	5	7.5	0-28	14.82±3.609
Total	53	79.1	8	11.9	6	9.0	0-54	28.37±6.501

Figure (1): Percentage distribution of total knowledge's school age children undergoing hemodialysis about their nutritional needs.

Part III: Nutritional status of the school age children undergoing hemodialysis.**Figure (2):** Percentage distribution of the total dietary needs for school age children undergoing hemodialysis.**Part (V): Relation between study variables.****Table (3):** Relation between total school age children' level of knowledge and their demographic characteristics (n=67).

Items	Unsatisfactory (n=53)		Moderate satisfaction (n=8)		Satisfactory (n= 6)		Chi-square	
	No.	%	No.	%	No.	%	X ²	p- value
Age/ years								
6-8	2	3.8	0	0.0	0	0.0	11.223	0.024*
8-10	24	45.3	0	0.0	0	0.0		
10-12	27	50.9	8	10.0	6	100.0		
Gender								
Male	34	64.2	3	37.5	6	100.0	5.826	0.054
Female	19	35.8	5	62.5	0	0.0		
Residence								
Rural	1	1.9	5	62.5	0	0.0	31.969	0.000*
Urban	52	98.1	3	37.5	6	100.0		
Educational stage								
No enrolled	12	22.6	0	0.0	0	0.0	35.633	0.000*
The first	2	3.8	0	0.0	0	0.0		
The second	4	7.5	0	0.0	0	0.0		
The third	15	28.3	1	12.5	0	0.0		
The fourth	6	11.3	0	0.0	0	0.0		
The fifth	8	15.1	6	75.0	1	16.7		
The six	6	11.3	1	12.5	5	83.3		
Number of family members								
4-6	36	67.9	6	75.0	0	0.0	11.220	0.004*
>6	17	32.1	2	25.0	6	100.0		
Ranking of the child								
The first	11	20.8	1	12.5	0	0.0	23.843	0.002*
The second	7	13.2	5	62.5	0	0.0		
The third	17	32.1	2	25.0	6	100.0		
The fourth	12	22.6	0	0.0	0	0.0		
The fifth	6	11.3	0	0.0	0	0.0		

Chi-square test, * statistically significance $p \leq 0.05$

Table (4): Relation between total school age children' level of nutritional need and their demographic characteristics (n=67).

Characteristics (n= 87).								
Items	High need (n=57)		Moderate need (n=23)		Low need (n=)		Chi-square	
	No.	%	No.	%	No.	%	X ²	p-value
Age/ years								
6-8	0	0.0	0	0.0	2	4.5	7.351	0.118
8-10	0	0.0	6	42.9	18	40.9		
10-12	9	100.0	8	57.1	24	54.5		
Gender								
Male	9	100.0	9	64.3	25	56.8	6.060	0.048*
Female	0	0.0	5	35.7	19	43.2		
Residence								
Rural	0	0.0	5	35.7	1	2.3	15.590	0.000*
Urban	9	100.0	9	64.3	43	97.7		
Educational stage								
No enrolled	0	0.0	0	0.0	12	27.3	35.108	0.000*
The first	0	0.0	0	0.0	2	4.5		
The second	0	0.0	0	0.0	4	9.1		
The third	1	11.1	7	50.0	8	18.2		
The fourth	0	0.0	0	0.0	6	13.6		
The fifth	2	22.2	6	42.9	7	15.9		
The six	6	66.7	1	7.1	5	11.7		
Number of family members								
≤6	1	11.1	6	42.9	35	79.5	17.935	0.000*
>6	8	88.9	8	57.1	9	20.5		
Ranking of the child								
The first	1	11.1	1	7.1	10	22.7	14.780	0.064
The second	0	0.0	5	35.7	7	15.9		
The third	7	77.8	6	42.9	12	27.3		
The fourth	1	11.1	2	14.3	9	20.5		
The fifth	0	0.0	0	0.0	6	13.6		

Chi-square test, * statistically significance $p \leq 0.050$ **Table (5): Correlation between total knowledge and total dietary needs for school age children undergoing hemodialysis**

Scale	Total dietary needs	
	r	p- value
Total knowledge	-0.780	0.000*

Pearson Correlation Coefficient, * statistically significance $p \leq 0.05$ **Table (6): Correlation between total knowledge and anthropometric measurement for school age children undergoing hemodialysis**

Anthropometric measurement	Total knowledge	
	r	p- value
Height percentile	0.130	0.296
Body weight percentile	0.050	0.686
Body mass index	0.014	0.911
Mid arm circumference	0.271	0.026*

Pearson Correlation Coefficient, * statistically significance $p \leq 0.05$

Table (7): Correlation between total knowledge and 24-hour dietary intake for school age children undergoing hemodialysis

24-hour dietary intake	Total knowledge	
	r	p- value
CHO(gm/d)	0.049	0.639
Protein (gm/d)	0.001	0.991
Fat(gm/d)	0.117	0.345
Energy(kcal/d)	0.100	0.420

Pearson Correlation Coefficient, * statistically significance $p \leq 0.05$

DISCUSSION

School-age children undergoing hemodialysis face unique nutritional challenges that require careful management to support their growth, development, and overall health. Hemodialysis, a critical medical intervention for children with kidney failure, necessitates specific dietary considerations to maintain optimal nutrition and manage potential complications. This aim to explores the essential nutritional needs of school-age children undergoing hemodialysis, highlighting the importance of a balanced diet, fluid intake control, electrolyte balance, and protein management to support their health and well-being during this crucial stage of growth and development. (Barber, 2024).

Adequate nutritional intake is essential for optimal development of children with CKD; however, achieving this is often challenging due to dietary restrictions. Proper nutrition is essential not only for physical growth but also for cognitive development and overall well-being during this crucial stage of childhood. Understanding and addressing these nutritional needs are paramount to optimizing the health outcomes and quality of life for school-age children undergoing hemodialysis. (Menezes et al., 2022).

Part I: Demographic characteristic of the school age children.

Regarding the demographic characteristics of the school age children, the results of the current

Study revealed that, more than half of school age children undergoing hemodialysis were aged 10-12 years old with the mean age of (10.09 ± 1.685) years (Table 1). The result might be due to children in this age range might

have developed CKD, which necessitate dialysis. Often kidney issues become more apparent and are diagnosed around this age. The study finding was agreed with Mohamed et al., (2021) entitled "Effect of foot reflexology on hemodialysis school age children on fatigue and sleep quality" who revealed that, the more than half of studied children aged had ranged between 9 - 12 years' old with the mean age of (9.19 ± 2.19) years.

Regarding gender, less than two thirds of the studied school age children undergoing hemodialysis were male. In researcher's point of view this might be related to that, some kidney diseases that lead to dialysis are more common in males due to genetic or hereditary reasons. The study supported with Darwish et al., (2020) entitled "Family impact and economic burden among caregivers of children with chronic kidney disease in Assiut, Egypt" who showed that, about two thirds of children were male.

In relation to residence, most of the studied school age children undergoing hemodialysis were lived in urban area. The result might be due to the study done at el-Sayed Galal & al-Zahra hospital that located in Cairo so that children come from the urbans area around. The study congruent with Rashid et al., (2023) entitled "Assessment of Nutritional Status and Growth in Children with End Stage Renal Disease Undergoing Maintenance Hemodialysis" who illustrated that, less than two thirds were lived in urban area.

Pertaining to educational stage, the present study showed that, less than one quarter of the studied school age children were at the third and fifth stage respectively. In researcher's point of this might be related to that, some kidney issues may not be obvious in early

childhood but become more apparent during school years when the child is more active. The study finding was parallel to **Azad Tehrani et al., (2020)** entitled “Assessment of nutrition status of children with chronic renal failure undergoing hemodialysis” who presented that, Child education one third were 5th & 5th the primary grade.

In relation to family member, the current study shows that, more than half of the studied school age children had 4-6 family members. The results might be due to; most families nowadays are nuclear family that range from 4 – 6 family members. The study accepted with **Mohammed et al., (2023)** entitled “Empowerment Program for Mothers to Improve the Quality of Life of Their Children undergoing Hemodialysis on Arteriovenous Fistula Care” who revealed that, less than half of children had 4-6 family members.

Concerning rank of child, the current study shows that more than one third of the studied school age children were the third child in the family. In researcher's point of view this could be related to that, some kidney diseases may have a genetic component, meaning that children in a particular birth order might be more susceptible to these conditions due to the family's genetic makeup. The study accepted with **Ghatas et al., (2020)** who studied that “Effect of Psychosocial Status of Children under Regular Hemodialysis on Their Quality of Life” who revealed that less than one third of children birth order were the third.

The study different with **El-Gamasy et al., (2017)** entitled “Assessment of physical and psychosocial status of children with ESRD under regular hemodialysis, a single center experience” who showed that, more than one third of children were the first child in the family.

Part II: Total knowledge of the school age children

The current study reveal that, less than three quarters of studied children undergoing hemodialysis had unsatisfactory total knowledge about chronic renal failure (**Table 2**). The result might be due to, the primary focus is often on managing and ensuring medical

stability, which can reduce the time spent educating children about their condition (the educational program might be performed the caregivers most often than children). The study finding was supported to **Tharwat et al., (2023)** who studied “Effect of Educational Program regarding Self-Care Health Behavior on knowledge and practices of Hemodialysis Adolescents” who presented that, the majority of studied adolescents had poor level of knowledge.

In the same line The study finding was agreed with **Ahmed et al., (2020)**. who studied “Effect of Nursing Intervention Program on Self-Esteem, Body Image and Quality of Life of Children undergoing Hemodialysis” who showed that, more than three quarters of children had poor level of knowledge.

The current study reveals that, more than three quarters of studied school age children undergoing hemodialysis had unsatisfactory total knowledge about nutritional needs (**figure 2**). In researcher's point of view, Children might not be able to fully grasp detailed nutritional requirements due to their age and cognitive development. The study finding was agreed with (**Osman et al.,2023**) in titled “Effectiveness of Self-Care Program on the Health-Related Quality of Life for Children Undergoing Hemodialysis” who showed that, more than half of children had unsatisfactory knowledge about nutrition.

Part (V): Relation between total school age children' level of knowledge and their demographic characteristics

The current study Reveals that, there were statistically significant difference between total knowledge level of school age children and age, residence, educational stage, number of family member and ranking of the child. in researcher's point of view, the variation in knowledge levels among children undergoing dialysis, influenced by factors such as age, residence, educational level, family size, and birth order. Younger children may have less developed cognitive abilities, while those in urban areas or with better educational opportunities generally have greater access to information and educational resources. Larger families might face challenges in allocating

time and resources for each child's development, and birth order can affect learning opportunities and responsibilities within the family. These diverse factors collectively shape the varying levels of cognitive development among these children. The study findings also were supported with *Tharwat et al., (2023)* entitled "Effect of Educational Program regarding Self-Care Health Behavior on knowledge and practices of Hemodialysis' Adolescents" who revealed that, there was a statistical significant difference between total knowledge of the studied adolescents and their (age, gender, level of education and years of undergoing hemodialysis).

The current study Reveals that, there were statistically significant difference between total nutritional need of school age children' and their gender, residence, educational stage and number of family member. The result might be due to, Gender influences metabolic rates and hormonal needs also, residence affects access to diverse and quality food. Moreover, educational stage impacts nutritional knowledge and activity levels. Beside that family size influences, the distribution of resources and dietary budget. These factors combine to create varied nutritional requirements and challenges for these children. The study findings also were supported with *Metasyah & Hidayati, (2023)* entitled "Nutritional Status in Children with End-Stage Kidney Disease Undergoing Hemodialysis and Other Related Factors" who revealed that, there is no meaningful relationship were found between groups with nutritional status and their gender, parent's education, income.

Regarding to correlation, the current study illustrates that, there were statistically significant negative correlation between total knowledge and total dietary needs. in researcher's point of view, they might not receive sufficient education about specific dietary needs related to dialysis, leading to inadequate knowledge about how to meet these requirements. Meanwhile, it can be challenging for children, especially younger ones, to comprehend complex dietary information due to their age or limited educational background. Moreover, Dietary needs can change over time, making it difficult to keep up with and adapt to

new requirements. Additionally, Families might be overwhelmed with caregiving and managing treatment, limiting their time and resources to learn and apply dietary information effectively. As a result, the information children and their families have may not align well with their dietary needs, leading to a negative correlation between the two.

Regarding to correlation, the current study illustrates that, there were statistically significant correlation between total knowledge and anthropometric measurement for school age children undergoing hemodialysis. From researcher's point of view, Children undergoing hemodialysis may show a relationship between their nutritional knowledge and anthropometric measurements because dietary awareness directly impacts their physical condition and growth. When they lack adequate awareness of their nutritional needs, they may make less optimal food choices, which can negatively affect their growth and anthropometric measurements such as weight and height. Consequently, anthropometric measurements may reflect how well they apply the nutritional information they receive.

Regarding to correlation, the current study reveals that, there weren't statistically correlation between total knowledge and 24-hour dietary intake for school age children undergoing hemodialysis. The results might be due to, children undergoing dialysis might not show a strong correlation between their dietary knowledge and their 24-hour dietary intake due to a lack of adequate education and training on dietary management. Even with some knowledge, applying this information effectively can be challenging, especially with changing nutritional needs and daily pressures. As a result, their actual food intake may not consistently reflect their understanding of dietary requirements.

RECOMMENDATION

Based on the findings of the current study, the following recommendations can be suggested:

√ Regular assessment of nutritional status for children undergoing hemodialysis through measuring their weight and height.

√ Provide hemodialysis children with empowerment programs which include effective health education that contain knowledge about hemodialysis, healthy nutrition and long term plan for children and families to improve their children's nutritional status.

√ Encourage the importance of regular follow-up and regular investigation of children with CKD to ensure proper CKD control and early detection of complication

√ Further research need to determine the effect of nutritional guidance on nutritional status of children undergoing hemodialysis on larger sample and for a long period of time in different setting.

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