Understanding the Parents Experience of Nutritional Guidelines Regarding Care Provided to their Children Receiving Chemotherapy

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Abstract

A child's ability to maintain a healthy diet and nutritional intake may be significantly influenced by receiving a cancer diagnosis and undergoing treatment. Inadequate oral intake can lead to a decline in nutritional status, which can affect organ and immune system function and require medical attention. A comprehensive dietary history is therefore necessary for a nutritional assessment. Aimed of the study was to evaluate the effect of nutritional education guidelines on parents' knowledge, reported practice and outcomes of children receiving chemotherapy. A quasi-experimental research design was conducted at pediatric Hematology and Oncology unit at Benha Specialized Pediatric Hospital affiliated to Ministry of Health. three tools used; First a Structured Interview Questionnaire form to collect data about characteristics of studied children's parents and their knowledge and Practice. The second tool was Reported Brazilian Healthy Eating Index-Revised (BHEI-R): dietary assessment. and Third Physical Assessment tool to evaluate the diet of the children under study. The results indicated statistically substantial improvements in the average score of parents' general knowledge and actions at the prior (r= .672**), post (r= $.506^{**}$), and follow up (r= $.576^{**}$) program phases, It can be concluded that The guidelines seem to have improved parents' knowledge and practice about nutrition for their children undergoing chemotherapy. Therefore, this study recommended that it is necessary to create and execute educational guidelines in pediatric oncology and hematology clinics in order to enhance parents' understanding and behavior with relation to feeding children with cancer.

Keywords: Cancer, Chemotherapy, Children's, Parents & Nutritional Guidelines.

Introduction

Developmental changes that occur during childhood can have a significant and long-lasting impact on a child's future. Children are backbone of a nation as on children" health and prosperity depend on the health of a nation. Children require the protection, care, and direction that parents and other caregivers often provide, particularly in their early years when they are most reliant on them. (WHO, 2021).

Cancer is broad and includes a variety of diseases that affect different body parts. Cancer defined the rapid growth of aberrant cells beyond normal borders, which subsequently infiltrate adjacent regions of the body and extend to organs, a process known as metastasizing. Metastases a leading cause cancerrelated death. There numerous cancer treatment options (WHO, 2020).

Cancer is a leading cause of death for children and adolescents. The likelihood of surviving a diagnosis of childhood cancer depends on the country in which the child lives: in high-income countries, more than 80% of children with cancer are cured, but in many low- and middle-income countries less than 30% are cured. There will have been 200,000 new instances of pediatric cancer diagnosed globally in 2018 (Charles Stiller, 2022).

A milestone was the introduction of so-called "multidisciplinary teams," consisting of health care professionals with expertise in specific areas of childhood cancer working together in an effort to provide the best care and treatment possible, where advances in the treatment and supportive care of childhood cancer over the last decades have led to dramatic improvements in survival and quality of life for children suffering from leukemia's, lymphomas, and solid tumor malignancies (**Chow, et al., 2020**).

The multidisciplinary tumor board discusses treatment plans for newly diagnosed cancers in children, therapy options for patients currently undergoing treatment, and clinical scenarios or difficult cases requiring expert consensus or additional national tumor panel consultation(s) for their management. Nurses play a prominent role in caring of children with cancer and their families. They help the kids and their families through a trying time by providing support and education. It is difficult for nurses to keep up a high standard of technical proficiency and the capacity to serve the kid and family as needed. (Joffe, et al., 2020). Nutritional status affects immune response and the response to medical therapies. Healthcare providers assess child's nutritional status for many reasons: to identify child at risk of undernourishment for early intervention or referral before they become malnourished, to recognize malnourished children for treatment malnourished who have longer hospital stays, slower recovery from infection and complications. Determining medical issues that impact the body's capacity to process food and absorb nutrients and performance that raise the possibility of malnutrition is therefore crucial to create suitable nutrition care plans, to guide nutrition counseling and instruction (**Cohen, et al., 2021**).

Parent may not know how to provide help. So, offer them a concrete task as taken to a physician's appointment. They can involve a wide range of emotions. Sometimes it is helpful to talk to a friend who has been a caregiver. If family member is caregiver it's important to keep lines of communication open and to set the illness aside at time. Caregiver seeks to support from social workers to voice their own worries, concerns and fears that they may not want to share with. Caregiver should take care of themselves (**Sullivan, 2021**).

Significance of the study

Nutritional assessment is the regular process of collecting and interpreting information, in order to, make decisions about the nature and cause of nutrition related health problems that affect an individual. Anthropometric assessments, data collection regarding a child's medical history, clinical and biochemical traits, dietary habits, current medical treatment, and food security status are all included in the nutritional assessment process.

Rather more, dietary assessment methods provide valuable data to measure dietary exposure in nutritional epidemiology Aim of the study: This study aims to: identify the effect of nutritional education guidelines on parents' knowledge, reported practice and outcomes of their children receiving chemotherapy

Aim of the study:

This aim will be fulfilled all the way through the ensuing goals:

- 1. Assess the parents' knowledge regarding care provided to their children receiving chemotherapy.
- 2. Develop nutritional guidelines for children receiving chemotherapy.
- 3. Implement nutritional guidelines on parents of children receiving chemotherapy
- 4. Evaluate the effect of nutritional guidelines on parents of children receiving chemotherapy knowledge and practices

5. Evaluate the effect of nutritional guidelines on children receiving chemotherapy

Research hypothesis:

- **H1:** Parents' knowledge, regarding nutrition of children receiving chemotherapy expected to be improved after implantation of the guidelines.
- **H2:** Parents' practices regarding nutrition of children receiving chemotherapy expected to be improved after implantation of the guidelines
- **H3:** Parental adherence to nutritional recommendations positively influences children's appetite, energy levels, and treatment tolerance

Subjects and Method

The study was propagated under the five core designs as following:

- 1. Technical design
- 2. Administrative design
- 3. Operational design
- 4. Ethical considerations.
- 5. Statistical design.

Subject and Methodology Research Design:

A quasi-experimental research design (pre, post and follow up) were employed to evaluate the effect of nutritional education guidelines on parents' knowledge, reported practice and outcomes of their children receiving chemotherapy

Settings:

The current study was conducted at the pediatric Hematology and Oncology unit at Benha Specialized Pediatric Hospital affiliated to Ministry of Health and Population. It received children from all over Qaluobia governorate. The unit have two rooms and each room contained 8 beds. The unit also have an intermediate surgical care unit composed of five beds. **Study Subjects:**

Two groups were included in the study:

Group (I): A convenient sample of all available parents of children (30) had cancer and receiving treatment in the study settings and agree to participate in the study.

Group (II): Purposive sampling of all children who had cancer with the following inclusion criteria: a) Age between 6-12 years of age. b) A hospital stay during the course of therapy; c) At least one month of cancer treatment. D) Capable of consuming food orally.

E) Free from any chronic disease.

Tools for data collection:

Three tools used for data collection:

Tool (I): Structured Interview Questionnaire Form: Part (A): Characteristics of the parents and their children, such as mothers' age, level of education, mothers' job, marital status, father age, father education, fathers' job, income, residence and crowding index, child age, gender, the number of siblings of the child, child order and academic years.

Part (B): Medical history of the child, including diagnosis, duration of illness in years, duration of treatment in months, number of hospital admission last years, number of days for hospital stay in the last years, have a surgery, have a blood transfusion, causes of blood transfusion and having symptoms.

Part (C): Parents knowledge about cancer, definition, at what age does cancer spread to children, types of cancers, causes of the cancer, primary signs that appear on a child with cancer, complications of cancer in children, precautions that must be taken to protect the child undergoing chemotherapy at home, how to prepare the child before the chemotherapy, how do you deal with the child during and after the chemotherapy, ways to treat cancer and purpose of chemotherapy.

Part (D): Assessment of the child's eating or dietary habits from data collected for parents. It was included questions about the type of feeding, number of meals per day, regularly of meals times, regularly of breakfast eating, eating snacks between main meals, prepare special meals for child other than family, like eating certain foods, hate eating certain foods, eat with the family and eat in front of the TV.

Scoring system for knowledge:

Every knowledge item was verified using a model key response; a full right response received two degrees, a partially correct response received one degree, and an incorrect or unknown response received zero degrees. The overall knowledge score fell into one of two categories:

- Poor (< 60%). average (60% - <75)

Tool (II): Brazilian Healthy Eating Index-Revised (BHEI-R): dietary assessment:

The BHEI-R is developed by recommendations from the 2006 dietary guidelines from the World Health Organization (WHO), the institute of medicine and the healthy eating index 2005 (HEI-2005) and the Brazilian cardiology society). The BHEI-R is estimated by scoring 12 components that characterize different aspects of a healthy diet. Each component is evaluated and scored from a minimum of 0 to a maximum of 20. The first 9 components of the BHEI-R are food groups. Total saturated fat, sodium, and So FAAS (calories from solid fat, alcohol and added sugar) constitute the other 3 components and are scored in the opposite direction to the other components (i.e., lower intakes have higher scores). For all components based on food groups, a full score is given for intakes, at or above, recommended amounts. A zero indicates that no foods in that group were consumed, whereas intermediate numbers of servings are awarded prorated scores. The maximum BHEI-R score is 100.

Tool III: Physical Assessment Sheet; it consisted of three parts :

Part (A): The clinical examination to identify any child's signs of malnutrition, it covered examination of the hair, face, tongue ,eyes, lips, gums, and teeth for any signs of malnutrition and/or vitamin deficiency. It also included assessment of the child's nails, skin, muscles, and abdomen .

Part (B): Anthropometric measurements, they included measurement of the child's height and weight for calculation of the body mass index (BMI) as kg/m2, mid -arm circumference.

Part (C): Biochemical analyses or laboratory investigations, it was involved measurements of hemoglobin and serum albumin.

Development of the guidelines Protocol: The **guidelines** were developed to improve parents' nutritional knowledge and practice provided to their children receiving chemotherapy.

Objectives of the guidelines:

- 1- Assess the parents' knowledge regarding care provided to their children receiving chemotherapy.
- 2- Develop nutritional guidelines for children receiving chemotherapy.
- 3- Implement nutritional guidelines on parents of children receiving chemotherapy.
- 4- Evaluate the effect of nutritional guidelines on parents of children receiving chemotherapy knowledge and practices
- 5- Evaluate the effect of nutritional guidelines on children receiving chemotherapy

Guidelines Contents:

The guidelines: were included five sessions. These sessions were involved meaning of childhood cancer, its types, clinical manifestations, predisposing factors, investigations and management. It also was covered instructions concerning the preparation of the child before, during, and after chemotherapy, side effects of chemotherapy, and dietary assessment and information about foods and preparations for food intake. The instructional program was created in the following four stages:

Assessment phase:

The nutritional training guidelines was constructed for the assessment of nutritional guidelines on parents' knowledge about care provided to children receiving chemotherapy, Prior to the training guidelines being implemented, a knowledge evaluation was conducted through individual parent interviews.

Planning phase:

Considering the outcomes of the interview questionnaire (from the phase of pilot and assessment). The researcher created the educational

training guidelines after examining the relevant literature. The goals and objectives of the instructional training guidelines were formulated based on identified needs, requirements, and deficiencies. The contents of the educational training guidelines were selected on the basis of identified needs. The instructional strategies that were chosen were lectures, group discussions, demonstrations, and small group instruction. pamphlets and handouts with theoretical content.

Implementation phase:

The guideline protocol on children receiving chemotherapy was developed based on actual requirements assessment and implemented for parent. The implementation phase was achieved through five sessions at a period of 5 weeks (one session / week).

Every session began with an overview of the previous one and the goals for the current session. Parents' engagement in the study was encouraged during sessions through the use of motivation and reinforcement.

Six-person groups were created to assist parents in understanding the pertinent program material. A copy of the guidelines was given to each parent. The period of sessions last for about thirty minutes.

For each group, a variety of teaching strategies were employed, including role playing, brainstorming, discussion, lecture, demonstration, and redemonstration.

The researcher produced the educational pamphlet and power point that served as guidelines for instruction after studying pertinent literature pertaining to the research issue.

Tool validity and reliability:

The validity of the tool was examined by a jury of three pediatric nursing specialists to test the study tools for clarity, relevance, comprehensiveness, simplicity, and applicability. Significant changes have been made to the question types and wording. This phase began in April of 2022 and was finished in a single month.

Reliability:

Cronbach's alpha for knowledge reliability statistics is 0.810, whereas for practice reliability statistics it is 0.852.

Ethical Considerations:

An official approval was received from the scientific research ethical committee of the faculty of nursing/ Benha University at 2 June 2024.

The conduct of this study will be formally approved by the required administrative staff at the study setting. An official approval for conducting the study will be obtained from the responsible administrative personal at the study setting.

Formal approval for the study's conduct will be granted by the relevant administrative staff at the

study site. The conduct of the study will get formal approval from the relevant administrative staff at the study location.

A verbal consent will be collected from patients for their involvement in the study. Ensuring complete privacy, total confidentiality of any obtained information will be ensured. Every participant's patient will receive an explanation of the study's purpose and nature.

Pilot study:

Pilot study was carried out on 10% of the total sample size (6 parents). It tested the validity, clarity, applicability, and feasibility of the study tools and the estimated time needed to complete each tool (I &II). Participants involved in the pilot study were not excluded from the study because Modifications were no done.

Field work:

The data gathering period spanned from the beginning of March 2022 to October 2023. The researcher interviewed the parents independently at pediatric hematology and oncology clinic at Benha Specialized Pediatric Hospital, stated the purpose of the study and obtained verbal consent from parents who were willing to participate before beginning the process of collecting data, which involved rotating for two or three days each week during the morning shift and using the tool mentioned above, then evaluated parents' level of knowledge.

The data was collected through two phases for assessment of parents. The first phase was done prior to conducting the educational guideline to have base line of data and identify their actual educational need, following the implementation of the instructional guideline, a second assessment phase was carried out to gauge how well parents understood the consequences of giving their children chemotherapy.

Evaluation phase:

During evaluation phase, the effect of the guideline education parents' knowledge toward children receiving chemotherapy was evaluated by utilizing the identical kind of tools that were previously employed for every parent. This was carried out right away following the intervention and lasted for 12 weeks (from mid-May to mid-October 2020).

Statistical design:

The data was organized, coded, computerized, analyzed, and tabulated using an electronic computer running the Statistical Package for Social Sciences (SPSS) version 20. The collected data was represented in term of number, percentage distribution, mean, standard deviation, relation coefficient Chi- square test and correlation. Taking in considerations when a significant level value were P > 0.05 and P ≤ 0.00 .

Results

Table	(1):	Frequency	distribution	of	studied	children	and	parents	regarding	Demographic
		characteri	stics (n=30)							

Demographic characteristics	(n =	30)
Demographic characteristics	Frequency	Percent
Age group: /year		
4-8	17	56.7
>8-14	13	43.3
Mean ± SD 8.07±2.79		
(Range) (4-14)		
Gender:		
Male	16	53.3
Female	14	46.7
Number of siblings of the child:		
One	3	10.0
Two	9	30.0
Three or more	18	60.0
Child's order among his siblings:		
The first	4	13.3
The second	12	40.0
The third	6	20.0
The last	8	26.7
Academic year		
Kinder Garden to third grade	18	60.0
Fourth to six grade	10	33.3
First Preparatory	2	6.7

Table (2): Frequency distribution of studied parents regarding Demographic characteristics (n=30)

Domographic characteristics	(n=30)			
Demographic characteristics	Frequency	Percent		
Mother's Age group: /year	16	52.2		
25-30	10	35.5		
30-40	14	40.7		
Mean ± SD 35.07±6.96				
(Range) (24-52)				
Mother's Education:				
Ignorant	8	26.7		
Read & write	4	13.3		
Basic education	3	10.0		
Intermediate (secondary)	13	43.3		
High education	2	6.7		
Mother's job				
Work	1	3.3		
Housewife	29	96.7		
Mother's marital status				
Married	27	90.0		
Divorced	3	10.0		
Father 's Age group: /year	77	00.0		
25-30	27	90.0		
30-40	5	10.0		
Mean ± SD 41.03±9.24				
(Range) (25-72)				
Father's Education:				
Ignorant	8	26.7		
Read & write	5	16.7		
Basic education	3	10.0		
Intermediate (secondary)	11	36.7		
High education	3	10.0		

Demographic characteristics	(n=30)	
Demographic characteristics	Frequency	Percent
Father 's job		
Work	25	83.3
Not work	5	16.7
Residence:		
Rural	23	76.7
Urban	7	23.3
Crowding index:		
<2	19	63.3
2+	11	36.7

Table (3): Frequency distribution of studied children regarding medical history (N=30)

Madical history	(n=30)				
Medical mistory	Frequency	Percent			
Diagnosis:	20	06.7			
Leukemia	1	90.7			
Non Hodgkin lymphoma	1	5.5			
Duration of illness in months:					
1 month to less than 12 month	26	86.7			
12 month to 36 month	4	13.3			
Mean ± SD 10.16 months ±7.38					
(Range) (1 months- 36 months)					
Duration of treatment in months:					
1 month to less than 12 month	26	86.7			
12 month to 36 month	4	13.3			
Mean ± SD 10.36 months ±7.26					
(Range) (1months- 36 months)					
Number of hospital admissions last year					
One	20	66.7			
Two or more	10	33.3			
Number of days for hospital stay the last year					
One day to two months	15	50.0			
More than two months	15	50.0			
Have a surgery:					
Yes	2	6.7			
No	28	93.3			
Have a blood transfusion:					
Yes	27	90.0			
No	3	10.0			
Causes of blood transfusion:					
Anemia	27	90.0			
Having symptoms@:					
Loss of Appetite	17	56.7			
Nausea	12	40.0			
Oral Infections	4	13.3			
Diarrhea	4	13.3			
Tooth decay	16	53.3			
Dry Mouth	4	13.3			
Vomiting	4	13.3			
Difficulty Swallowing	3	10.0			
Indigestion	3	10.0			
Weight Loss	7	23.3			
Bleeding	10	33.3			

@ more than one answer

Table (4): Percentage	distribution	of studied	children	and	parents	regarding	children's	parents'
knowledge	about cancer	: (N=60).			•	0 0		•

Items		Pre		Post		low up	(Cochran's Q test)	
	No	%	No	%	No	%	p-value	
What is cancer @								
Communicable	0	0.0	0	0.0	0	0.0		
Acute	0	0.0	0	0.0	0	0.0		
Chronic	1	3.3	30	100.0	30	100.0	(543.97)	
Can be controlled	0	0.0	22	73.3	20	66.7		
Recovered from it	2	6.7	10	33.3	8	26.7	.000*	
Disturbances in the metabolic process, which result in an increase in the level of	26	867	0	0.0	0	0.0		
sugar in the blood.	20	00.7	0	0.0	0	0.0		
Do not know	1	3.3	0	0.0	0	0.0		
At what age does cancer spread to children	n @							
(1<5) years	29	96.7	0	0.0	0	0.0		
(5<10) years	0	0.0	0	0.0	0	0.0		
10-15 years	0	0.0	6	20.0	8	26.7	(443.67)	
All ages	0	0.0	24	80.0	22	73.3		
Do not know	1	3.3	0	0.0	0	0.0	.000**	
@) More than one choice was allowed	*:	Signific	ant			**: H	ighly significant	
Cable (5): Percentage distribution of stukent knowledge about cancer (N=0)	udied (50)	childre	1 and	parent	s reg	arding o	children's parent	
 T4		Pre		Post		Follow u	ip (Cochran's	

Items	Pre		Post		Follow up		O test)
	No	%	No	%	No	%	p-value
Censer affected areas @							
Blood	1	3.3	24	80.0	13	43.3	
Brain	1	3.3	0	0.0	0	0.0	
Glands	1	3.3	0	0.0	0	0.0	
Skin & tissues	0	0.0	22	73.3	14	46.7	
Kidneys	0	0.0	14	46.7	14	46.7	(569.23)
Bones	0	0.0	18	60.0	12	20.0	.000*
Liver	0	0.0	4	13.3	4	13.3	
Eye	0	0.0	0	0.0	0	0.0	
Do not know	27	90	9	30.0	13	43.3	
What are the causes of cancer @				•			
Infection	0	0.0	10	33.3	10	33.3	
Child exposure to radiation	0	0.0	0	0.0	0	0.0	
Treatment Error	0	0.0	0	0.0	0	0.0	
Hereditary	0	0.0	20	66.7	16	53.3	
Mother's exposure to radiation during pregnancy	0	0.0	30	100.0	24	80.0	(466.62)
Do not know	30	100.0	6	20.0	10	33.3	.000*
What are the primary signs that appear on a chi	ild wi	th cance	r@	•			
Change in the urination and excretory system	0	0.0	0	0.0	0	0.0	
Sudden weight loss	2	6.7	20	66.7	14	46.7	
Don't heal wounds	3	10.0	0	0.0	0	0.0	
Unusual bleeding or secretions	0	0.0	6	20.0	6	20.0	
Difficulty swallowing	0	0.0	22	73.3	12	40.0	
Strange swelling in the body	0	0.0	0	0.0	0	0.0	(522.33)
Hoarseness or persistent cough	9	30.0	0	0.0	0	0.0	.000*
Fatigue or fever	28	93.3	30	100.0	30	100.0	
Change in the skin such as (redness, itching, changing the color of the skin to a darker color)	2	6.7	4	13.3	3	10.0	
Sever itching	0	0.0	0	0.0	0	0.0	
Bone ache	4	13.3	10	33.3	6	20.0	
Do not know	2	6.6	0	0.0	Ő	0.0	
More than one choice was allowed	*: Sig	nificant	-		-	**· High	ly significant

Facility habits	(n=30)			
Feeding habits	Frequency	Percent		
Feeding type	30	100.0		
-Oral	50	100:0		
Number of main meals per day				
Two meals	2	6.7		
Three meals	28	93.3		
Regularity of meal times				
Always	16	53.3		
Sometimes	14	46.7		
Regularity of breakfast eating				
Always	16	53.3		
Sometimes	13	43.3		
Never	1	3.3		
Eating snacks between main meals				
Sometimes	9	30.0		
Never	21	70.0		
Prepare special meals for child other than family meals				
Always	1	3.3		
Sometimes	1	3.3		
Never	28	93.3		
Like eating certain foods				
Yes	1	3.3		
No	29	96.7		
Hate eating certain foods				
No	30	100.0		
Eat with the family				
Yes	29	96.7		
No	1	3.3		
Eat in front of the TV				
Yes	27	90.0		
No	3	10.0		

Table	(6): Frequency	distribution of	f studied children	regarding Fe	eding Habits

Table (7): Total children's parents' knowledge about cancer and its nutrition pre, post and following the program (N=60).

Total children's parents'	Pre		P	ost	Folle	ow up	(p-value)#	
knowledge	No	%	No	%	No	%		
Poor knowledge	43	71.7	0	0.0	0	0.0	.000**1	
Fair knowledge	15	25.0	18	30	22	36.7	.000**2	
Good knowledge	2	3.3	42	70.0	38	63.3	.000** 3	
Paired t-test								
Total mean knowledge score	4.53	±1.3	9.83	±2.8	9.21±1.6		.000**1 .000** ² .000** ³	

#: X2 Test

*: Significant

**: Highly significant

P1: Pre versus Post

P2: Pre versus Follow up

P3: Post versus Follow up

 Table (8): Median and interquartile ranges of the Brazilian Healthy Eating Index-Revised components among the studied children throughout the study phases

El ann an ta		Pre (n=30)		Post (n=30)		Follow up (n=30)	
Elements	М.	IQR	Median	IQR	М.	IQR	value#
Total grains (0-5)	3.4	3.0;4.6	4.6	3.3;5.0	4.6	3.2;5.0	< 0.01**
Whole grains (0-5)	0.1	0.0;0.3	1.4	0.3;1.8	1.6	0.3;1.9	< 0.01**
Total vegetables and legumes (0-5)	3.4	1.7;3.7	4.5	2.8;5.0	4.6	3.1;5.0	.033*
DGOV and legumes (0-5)	3.1	1.8;4.1	4.7	3.1;5.0	4.7	3.1;5.0	.022*
Total fruits (0-5)	3.2	1.6;3.6	4.4	2.9;5.0	4.4	3.0;5.0	.012*
Whole fruits (0-5)	3.4	1.4;3.8	4.6	2.8;5.0	4.6	2.8;5.0	< 0.01**
Meat, eggs and legumes (0-10)	6.8	5.9;8.9	9.7	5.9;10.0	9.7	5.9;9.8	.000**
Milk and dairy (0-10)	4.1	3.0;6.0	6.3	3.8;8.9	6.9	4.1;9.4	.04*
Oils (0-10)	8.0	7.9;9.8	10	8.8;10.0	10	8.8;10.0	< 0.01**
Saturated fat (0-10)	6.8	2.2;8.6	7.9	3.9;9.9	7.9	4.1;9.9	< 0.01**
Sodium (0-10)	7.8	7.5;9.3	9.9	8.4;10.0	9.9	8.4;10.0	.032*
SoFAAS (0-20)	11.9	7.9;18.2	18.2	13.0;20.0	17.8	13.0;19.7	.000**
BHEI-R total score (0-100)	62.0	43.9;80.9	86.2	59;95.6	86.7	59.8;95.7	.000**

 Table (9): Frequency distribution of the studied children regarding dietary assessment level throughout the study phases

Lovola	Pre (n=30)		Post (n=30)		Follow up (n=30)		
Leveis	No	%	No	%	No	%	p-value#
Good diet ≥ 85	0	0.0	8	26.7	13	43.3	
Fair diet (65- 84)	17	56.7	15	50.0	14	46.7	.000**
Poor diet < 65	13	43.3	7	23.3	3	10.0	

Table (10): Frequency distribution of the studied children regarding physical status throughout the study phases

Physical Status	Pre (n=30)		Post (n=30)		Follow up (n=30)			
	No	%	No	%	No	%	p-value#	
Normal	14	46.7	18	60.0	19	63.3	.042*	
Abnormal	16	53.3	12	40.0	11	36.7		
Paired t-test								
Total physical status score	$12.33 \pm .93$		14.27 ± 1.40		14.89±1.6		.000**	

 Table (11): Mean and standard deviation of the studied children regarding anthropometric parameters & blood analysis throughout the study phases

Anthropometric parameters	Pre (n=30)		Post (n=30)		Follow up (n=30)		(p-value)#
& blood analysis	Μ	SD	Μ	SD	Μ	SD	
Height. (cm)	118.17	16.51	120.13	11.82	120.52	11.92	1.0
Weight. (kg)	24.95	11.79	26.50	10.92	26.91	11.88	.049*
Mid arm circumference(cm)	19.30	4.48	19.56	4.92	20.01	3.76	.033*
BMI	24.95	11.79	26.33	11.82	27.89	11.93	.011**
Hemoglobin. (g/dl)	9.63	2.46	10.09	2.31	10.44	2.63	.027*
Serum albumin(g/dl)	4.18	.48	4.01	.74	3.55	.23	.435

Part (1) Table (1): Indicates that the children in the research had a mean age of 8.07 ± 2.79 year. Related to gender, 53.3% of them were male. Regarding to academic year, 60.0% of the studied children were from Kg to three grades. As for the number of child's siblings, 60.0% of children were having three or more siblings, while 40% of them were the second between their siblings,

Table (2): Reveals that the mean age of the studied children's mother was 33.73 ± 4.06 year, while the

mean age of the studied children's father was 35.07 ± 6.96 year. Regarding parents' education, 43.3%, 40.0% of the studied children' mother and father had secondary education respectively. Regarding to parents' job, 73.3% of the studied children' mother was housewife, while 60.0% of the studied children' father was employee. As for residence, 80.0% of the children's parent were from rural area. According to crowding index, 63.3% of them were more than two.

Table (3): Shows that, the leukemia was the most common type of cancer (30.0%), followed by bone cancer (25.0%) among the studied children. Regarding the duration of illness and treatment, the mean duration of illness was 2.30 ± 1.18 years, while the mean duration of treatment was 27.60 months±14.2. As for number of hospital admissions last year, 73.3% of the studied children admitted to hospital one time while, 20.0% of them admitted to hospital two times . Concerning to number of days for hospital stay the last year, 73.3% of the studied children stayed at hospital from month to two months while, 20.0% of them staved at hospital for more than two months. Also, all the children hadn't any surgery (100.0%). Related to blood transfusion, 56.7% of studied children had blood transfusion, while 43.3% of them hadn't blood transfusion, and the main cause of blood transfusion was anemia (56.7%). Also, the table reveals that all the studied children had loss of appetite and tooth decay (100.0%), followed by dry mouth (96.7%), oral infection (93.3%), diarrhea and weight loss (90.0%), then nausea (73.3%).

Table (4): Reveals that 60.0 % of studied children's parents didn't know what the cancer is before the program while, after the program all of them (100.0%) knew what cancer is. Also, before the program 80.0% of studied children's parents didn't know at what age cancer spreads to children, while after the program 90.0% of them knew at what age cancer spreads to children. There were statistically significant improvements in children's parents' knowledge (p<0.001) in post, while, showed some declines in parents' knowledge in the follow-up but remained significantly higher compared with the preprogram levels and post program levels (p<0.001).

Table (5): Suggests that, all the studied children's parents (100.0%) didn't know what the cancer affected areas are before the program while, after the program and at follow up stage this percentage decreased to be no one of them didn't knew what are the complications of cancer in children. Also, before the program all the studied children's parents (100.0%) didn't know what are the causes of cancer, while after the program this percentage decreased to be only 10.0% of them didn't knew what are the causes of cancer, then at the follow up stage this percentage increased to be (16.7%). Additionally, the table reveals that 36.7% of the studied children's parents didn't know what are the primary signs that appear on a child with cancer before the program while, after the program and at the follow up stage this percentage decreased to be no one of them didn't know what are the primary signs that appear on a child with cancer. These improvements were statistically significant (p<0.001).

Table (6): Showed that all studied children were depending on oral feeding (100.0%). Regarding the number of main meals per day, 93.3% of studied children had three meals per day and 6.7% had two main meals per day. Related to eating snacks between main meals, 93.3% of studied children were not eating snacks between main meals, while 6.7% of them were eating snacks between main meals. Additionally, 96.7% ate with the family in front of the TV (90.0%).

Table (7): Reveals that before the program, 71.7 % of the studied children's parents had poor knowledge about cancer, chemotherapy and its nutrition, while after the program and at follow up stage this percentage decreased to be no one of them had poor knowledge about cancer, chemotherapy and its nutrition. Additionally, the table reveals that only 3.3% of the studied children's parents had good knowledge before the program compared to after the program this percentage increased to be 70.0% of them had good knowledge about cancer, chemotherapy and its nutrition. These improvements were statistically significant (p<0.001).

Table (8): Indicated variations in all median and interquartile ranges of the Brazilian Healthy Eating Index-Revised components among the studied children throughout the study phases. The percentages were low concerning all components especially whole grain, milk, dairy milk, and calories from solid fat, and added sugar (0.1, 4.1, and 11.9 respectively). The post-program phase demonstrated a statistically significant improvements among all median and interquartile ranges of the Brazilian Healthy Eating Index-Revised components among the studied children (p< 0.05 &p<0.001). At the followup phase, the areas of significant improvements continued but with some slight declines in some of them. Concerning the total BHEI-R, before the program, total score of BHEI-R was 62.0, which increased to 86.2 at the post program phase and increased to 86.7 at the follow-up phase. These differences were statistically significant.

Table (9): Revealed that before the program, 43.3% of the studied children had poor diet, while after the program and at follow up stage the percentage decreased to 23.3% had poor diet. Additionally, the table revealed that before the program none of the studied children had a good diet while after the program this percentage increased to 26.7% of them had good diet. These differences were statistically significant (p<0.001).

Table (10): Revealed that before the program, 53.3 % of the studied children had abnormal physical status, while after the program the percentage decreased to 40.0% having abnormal physical status. Additionally, at the follow up stage the percentage decreased to

36.7%. On the other hand, the table revealed that 46.7% of the studied children had normal physical status while after the program the percentage increased to 60.0% having normal physical status. These differences were statistically significant (p<0.05).

Table (11): Showed a statistically significant difference in total mean score of all anthropometric parameters except the height among the studied children pre and post the educational program (P<0.05&P<0.001).

Discussion

The medical management of children diagnosed with cancer required close monitoring of their food as part of an interdisciplinary care strategy. Historically, the management's primary focus has been on preventing under nutrition. Up to 50% of pediatric cancer patients were at risk of malnutrition in the absence of nutrition therapy. Maintaining normal growth and development was the primary goal of nutrition interventions; nevertheless, weight and growth-based outcomes are frequently the main focus of nutrition therapy for children with cancer (Cohen, et al., 2021).

Regarding characteristics of the children, the present study results indicated that, all of the children were undergoing chemotherapy treatment. This was unique because it was effective for systemic cancers that cannot be managed by surgery or radiation. Also, the mean age of the studied children was 8.30 ± 1.97 years old. This could be connected to the fact that school age was the most common age at which cancer first appeared in children.

These results were in accordance with **Kızmazoğlu**, et al., (2019) who conduct study about "Children's, siblings', and parents' perceptions in assessing the health-related quality of life of children who have survived pediatric acute lymphoblastic leukemia" and found that 70% of children receive chemotherapy.

In the same line, **Boshagh, et al.**, (2022) who conduct study about "Effect of Family-Centered Empowerment Model on Mothers of Children with Leukemia's Knowledge and Caring Performance: A Randomized Clinical Trial" and found that the mean age was 7.41 ± 2.82 years old.

Concerning to gender of the studied children, the present study demonstrated that, two thirds of the studied children were males and less than half of the children were ranked as the second within their families. Gender differences are presumably caused by complex interactions between hormone and environmental risk factors, as well as variances in their exposure. However, the precise causes remain unknown. The fact that men are more likely than women to develop cancer could be partly explained by the immune systems and responses that vary between the sexes.

This results was in harmony with **El malla, et al.,** (2017) who conducted a study at Children's Cancer Hospital in Egypt titled "Advances in Pediatric Oncology- a Five-Year Nation-Wide Survival followup" and noted that over half of the children in the study were male and disagreed with Obaid, (2018) who conduct a study about "Mothers' Awareness of Leukemic Children Receiving Chemotherapy at Baghdad City Oncology Units" and mentioned that 50% half of studied children were male.

The current study results evident that the mean age of the studied mothers and fathers were 33.73 ± 4.06 and 40.37 ± 2.97 years old respectively. Also, two thirds and two fifth of the studied mothers and fathers completed secondary education. More than two third of mothers were housewives.

The level of education was a key element in understanding and updating information that reflect positively on care provided for the sick child.

These results concurred with **Arpaci**, et al., (2018) who perform study in India about "Evaluating dietary issues in young cancer patients and their parents' information needs: a parent's viewpoint and stated that the mothers in the study had an average age of 36.46 ± 6.17 year and the mean age of the studied fathers were 39.95 ± 5.73 year. In contrast with an Egyptian study by Hassan and Ibrahim (2018) that examined the impact of supportive nursing interventions on the burden and coping mechanisms of sixty moms of cancer-stricken children , more than one third (38.3%) of the women in the study had a technical degree, while majority (80%) of them were housewives.

The current study results revealed that, majority of the studied parents were lived in rural area. This outcome may be explained by the Benha pediatric oncology clinic, which treats children with a variety of cancers in the governorate of Qaluobia and the surrounding rural and semi-urban areas.

In the same context, **the United Nations Educational, Scientific, and Cultural Organization** (2017) documented that the rural population was 57% of the total population worldwide. Similarly, according to Egypt Demographics Profile (2020), 57% of the country's population lived in rural areas, while the yearly rate of change for urbanization was 1.68%.

Regarding the child's medical history, Leukemia was identified in more than one-third of the children in the research. Leukemia was the most frequent malignancy in youngsters, which may be the reason behind this.

This finding was supported with the American Cancer Society's 2020, leukemia is the most frequent disease in young children. In addition to the finding of **Kaur**, et al., (2017) who conduct a study about "Evaluate the Impact of a Well-Designed Education Program on Parents' Understanding of Chemotherapy Side Effects at Home" and found that most of children diagnosed with Leukemia. In contrast with the finding of **Sajeev, et al., (2017)** who stated that 48.2% of children diagnosed with solid tumors.

The present study results showed that more than two thirds of the studied children admitted to hospital one time and stayed from month to two months last year. This might be due to the different investigations and treatment. This finding was incompatible with **Shabeen, et al., (2017)** who conduct a study about "Mothers' knowledge about the nutrition of their children with leukemia" and found that more over 25 percent of the children in the research had previously spent less than a week in the hospital.

The current study results showed that all of children complained from loss of appetite and tooth decay. Also, the majority of them complained from dry mouth, oral infection, diarrhea and weight loss. These finding could be explained by all of these symptoms were considered the most common side effects associated with chemotherapy in children.

These finding were consistent with Atay, (2011) who conducted a study in Turkey about "characteristics and symptom clustering in youths receiving or not receiving cancer therapy" and found that all children had loss of appetite.

In relation to parent's knowledge about cancer, the current study results proved that more than half and all of them did not know the definition and types of cancer before the program. The fact that the parents were unaware of chemotherapy and children illness could be used to explain these outcomes. These finding agreed with **Hasan**, et al., (2020) who found that 100% & 88.6% of mothers did not know the definition, cancer affected areas.

The current study results indicated that all of the studied parents didn't know the causes of cancer. Also, more than one thirds of them didn't know the primary signs that appear on a child with cancer before the program. These finding agreed with **Boshagh, et al., (2022)** who carried out research on "effect of family-centered empowerment model on knowledge and caring performance of mothers of children with leukemia" and found that most of parents lacked sufficient knowledge about cancer's pre-test origins and symptoms.

Concerning feeding habits of the studied children, the current study showed that all children depended on oral feeding and the majority did not eat snacks between main meals. These findings were incongruent with previous studied carried out in Australia by **Cohen, et al., (2021)** about "Poor Diet Quality in Children with Cancer During Treatment" and found that only 23% were depending on oral supplement. Also, these findings disagreed with **Bensouda, et al., (2020)** who conducted a study in Casablanca about "Assessment of oral health-related quality of life among children with acute Leukemia" and found that nearly two thirds of studied children took snacks less than 2 times a day between meals.

Moreover, the current study shown that more than two thirds and more than half of the studied parents possessed a significant good knowledge level after program and at the follow up stage respectively. This could be due to the nutritional guidelines had a positive effect on the improvement of parents' knowledge.

This finding was supported with de la Mendonca, et al., (2021) who studied "Nursing care in pediatric oncology palliative care" and demonstrated that parents of children affected by cancer had a markedly higher degree of understanding following the viewing of an instructional movie regarding the illness. Similarly, this finding agreed with Nova, et al., (2019), who conducted a study about the effect of multimodal nutrition education on parents' comprehension and children's leukemia-related body weight shift and showed that there was a notable increase in the parents' level of understanding following the multimedia-based instruction.

In the current study, there was a statistically significant improvement in all median and inter quartile ranges of the Brazilian Healthy Eating Index-Revised (BHEI-R) components among the studied children especially total vegetables & Whole fruits, whole grain, milk & meat after program and at the follow up stage. This finding was in harmony with Cohen, et al., (2021) who found that there was a statistically significant improvement in the mean intake of food groups as a total percentage of serves recommended by the Australian Dietary Guidelines especially total vegetables, Whole fruits, whole grain, milk, and Meat. The consumption of fruits and vegetables has a protective effect on risk of obesity and some types of cancer and also, the intake of milk and meat is essential, not only because of the protein value but also because it provides calcium and iron.

In the current study, there was a statistically significant difference in the total mean scores of all anthropometric parameters except the height among the studied children during program phases. **Kadir, et al., (2017)** who conducted a study about "Nutritional Assessment of Children with Acute lymphoblastic Leukemia" and found that the mean score of weight was 18.81 ± 9.71 , which increase during induction of chemotherapy with a statistically significant difference, supported this study. This is because of the presence of steroids in induction chemotherapy of

all protocols of leukemia and improvement of nutrition.

In the current study, there was a statistically significant difference in the total mean score of mid arm circumference and BMI before, post and followup program. This finding agreed with **Sudersanadas**, **et al.**, (2017) who found that Body mass index (BMI) increased significantly during induction. Also, there was a change in growth parameters before, during and after six weeks of induction of chemotherapy.

Conclusion:

Based on the results of the current study, it could be concluded that the nutritional education guidelines had a profound effect on improving on parents' knowledge, practice and outcomes of children receiving chemotherapy as there was a statistical difference throughout the guidelines phases.

Recommendation:

Based on the findings of this study and the review of the literature, this study recommended that:

- Create and execute educational guidelines in pediatric oncology and hematology clinics in order to enhance parents' understanding and behavior with relation to feeding children with cancer.
- Update the parents' knowledge and practice guidelines regarding nutritional assessment to prevent malnutrition during chemotherapy.
- Use of innovative methods of health education in teaching all information about cancer and treatment as well as nutritional assessment methods to promote children's health.
- Conduct further studies should on a larger sample of parents for generalization of results.

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