Effect of Educational Program for Mothers on Nutritional Status of Children with Non-Organic Failure to Thrive

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Abstract

Background

Non-Organic Failure to Thrive include inadequate caloric intake caused by behavioral or psychological problems such as emotional deprivation, maternal neglect, poor maternal child relationship and disordered interactions between a child and caregiver. **Aim :** The present study was aimed to evaluate the effect of educational program for mothers on nutritional status of children with non-organic failure to thrive. **Research design:** A quasi-experimental research design was used. **Setting:** The study was conducted at outpatient clinic gastroenterology and nutrition of Tanta Main University Hospital **Subjects :** A purposive sampling of sixty mothers and their children with nonorganic failure to thrive were involved in the study **Tools :** Two tools were utilized to collect the required data Tool (I): Mothers' Knowledge Questionnaire about Non - Organic Failure to Thrive, Tool (II): Nutritional Assessment Sheet. **Results**: The majority of the mothers had poor knowledge pre educational program, while immediate and three month after educational program the total scores of mothers 'knowledge were improved. **Conclusion**: It was concluded that mothers` knowledge in relation to care of children with non-organic failure to thrive were improved after implementation of an educational program. **Recommendations*:*** conducting in-service educational program about nonorganic failure to thrive to nurses and mothers at pediatric outpatient endocrine clinic to improve their knowledge regarding non-organic failure to thrive.

Keywords: Children, Mothers, Non-Organic Failure to Thrive, Nutritional status.

Introduction

Nutrition is an important factor in early childhood survival and development, but also life long health. Nutritional deficiencies have negative effects across generations. Stunting impairs cognitive and learning abilities, whereas wasting result in developmental delays. The growth of every child is unique. Children develop and learn continuously, but not always in a predictable way (**Gokalp, Yıldız & Halıcıoğlu Baltalı, 2021)**.

During infancy and early childhood, young children experience significant physiological changes due to their rapid growth and nutritional susceptibility.

The early years of life are crucial for developing healthy behaviors to continue lifelong. (**Şenol &Şenol, 2023)**.

Inadequate growth in early childhood is referred to as failure to thrive (FTT). It is applied to children whose current weight or weight gain rate is significantly lower than that of others of their own age and sex (less than the fifth percentile) (**Hill, 2023**). Faltering Growth (FG), malnutrition are the more recent definition and often associated to express the imbalance between dietary intakes and needs for macro- and micronutrients. (**Goodwin, Buel &Cantrell, 2023)** Globally, malnutrition remains a challenge. Currently, child in every five children less than of five years is stunted worldwide, 6.7% are wasted (**Global Nutrition report, 2021)**. According to statistical records of Paediatric Hospital of Tanta Main University Hospital, number of children attended to the outpatient clinic gastroenterology and nutrition diagnosed with non - organic failure to thrive, were 75 child in 2022, 160 child in 2023 and 180 in 2024. (**Medical Statistical Records of Tanta Main University Hospital at Paediatric Medical department. 2024**). The most commonly used etiologic classifications are nonorganic or organic. While there are several possible causes of organic FTT, most children have a nonorganic reason of their poor development and/or weight gain **(Khalil , Husain , Alkhateeb & Alezzi , 2019)**.

Inadequate feeding practices, neglect, physical abuse, emotional trauma, mental health issues like depression, and other elements like poverty can all contribute to inadequate nutrition, which is the most common cause of failure to thrive (**Mertens et al., 2023).**

Most FTT children who present in a primary care setting are nonorganic

and do not have an underlying medical condition. As children to grow and develop regularly, parents or caregivers caring is just as crucial as proper nourishment. (**Mohamed, El Shehaby, Mohamed, Saleh & El-Asheer, 2022**).

The common manifestations of non-organic FTT are lack of weight gain, learning impairments, and delays in achieving developmental milestones like rolling over, crawling, and talking. Growth variables like height and weight do not increase as expected, they exhibit delayed motor development, exhaustion, and irritability, and they exhibit a lack of emotions like smiling, laughing, or making eye contact. Excessive sleepiness and lack of vocalization (**Johns, 2022**). The long-term effects of FTT/malnutrition are a higher prevalence of developmental delay, a somewhat lower IQ than anticipated, some prolonged weight and height loss later in childhood, learning challenges, and behavioral issues are some of. Children's development may be hampered by the emotional and environmental issues that frequently lead to malnutrition (**Franceschi, et al., 2021).**

Nonorganic FTT is most prevalent and therefore dietary guidance and careful observation of the child's weight gain and development rate by the primary care physician are essential aspects of medical care. Family's feeding habits, also are crucial component of nnutritional assessment of a child with FTT not only evaluation of food intake. Intake of macro and micronutrients may be impacted by food allergies. A child may not receive a sufficient diet due to social and environmental issues, including family finances, caregivers' cooking skills, and family attitudes on what constitutes a healthy diet. The existing diet needs to be nutritionally analyzed. **(Ayed, Ali & Sayed, 2021)**.

Teaching to the caregivers about healthy eating should be the first step in nutritional intervention. This should involve age-appropriate nutrition and suitable feeding practices for catch-up growth. Protein and calories must be added to the diet. Giving a toddler nutritional supplements could be a reasonable strategy to increase their intake of calories and protein. Commercially available instant breakfast powders or dry skim milk powder can be used to fortify milk. Oil, margarine, or butter can be used to increase calories without raising serving sizes (**Sabino et al., 2020)**.

Significance of the study

Mortality rates and deaths of under-five children from malnutrition was 6.9 million are concentrated in Africa. Undernourished children have weakened immunity and impaired cognitive function, which leads to their poor health outcomes, loss of future productivity and low academic performance. **(Karlsson, Kim, Guerrero, Hasman& Subramanian, 2022).** Mothers are the first caregiver of children. Therefore, there is a strong relation between children's nutritional status and mothers' nutritional knowledge. The nutritional outcomes of children are affected by the knowledge, awareness, and skill levels of mothers, which in turn influence their practices. avoid nutritional problems in children and achieve optimal growth **(Anato, 2022).** Therefore, the aim of the present study was to evaluate the effect of mothers' educational program on nutritional status of children with non-organic failure to thrive.

Aim of the Study

The study was aimed to evaluate the effect of educational program for mothers on nutritional status of children with non-organic failure to thrive.

Research Hypothesis

The nutritional statues of children with non-organic failure to thrive expected to be improved after implementation of an educational program for mothers.

Subjects

Research Design:

A quasi-experimental research design was utilized in the current study.

Study Setting:

The study was conducted at outpatient clinic gastroenterology and nutrition of Tanta Main University Hospital which is affiliated to Ministry of higher education and scientific research.

Subjects:

A purposive sampling of sixty mothers and their children with nonorganic failure to thrive were included in the study.

Inclusion Criteria for Children:

-Both sexes, with non-organic failure to thrive, aged from 1- 5 years.

Exclusion Criteria:

- Free from chronic diseases that may affect nutritional status e.g., heart disease, diabetes mellitus, kidney disease and bronchial asthma.

Tools of data collection

Two tools were used to collect the required data; they included the following:

Tool I: Mothers' Knowledge Questionnaire about Non-Organic Failure to Thrive:

It was developed by the researcher after reviewing the relevant and recent literatures to assess mothers' knowledge regarding children with non-organic failure to thrive. **(Erica, 2023; Hasan & Fatema, 2020)**. It was composed of two parts:

Part (1): Socio-demographic characteristics which includes:

a-: Mothers' characteristics as age, level of education, occupation, residence, marital status, number of siblings in the family, family income and family type.

b - Children characteristics as age, sex, birth order

Part (2): Mothers' knowledge regarding non- organic failure to thrive

It was developed by the researcher after reviewing the recent literatures to assess mothers' knowledge regarding non- Organic Failure to Thrive such as definition, manifestations, types, causes, complications, prevention, management, food pyramid (definition, food pyramid groups, benefits of healthy nutrition, hazards of malnutrition on health.

(Hasibuan, Batubura & Suryani, 2019).

Scoring system for mothers' knowledge was as the following: -

-Correct and complete answer was scored (2).

-Correct and incomplete answer was scored (1).

-Wrong or don't know was scored (0).

Total scoring system for mothers' knowledge was categorized as the following: -

-High level of knowledge was considered from 70 - 100%.

-Moderate level of knowledge was considered from 50 < 70%.

-Low level of knowledge was considered < 50%

Tool II: Nutritional Assessment Sheet: It was developed by the researcher after reviewing the recent literatures to assess nutritional status of children with non-organic failure to thrive **(Díaz , Ontai, Shilts, Lanoue, Townsend,2022).**

1-Anthropometric measurements included weight and height according to standard measurement by world health organization.

2- Daily dietary intake: 24 hours recall method to calculate the daily calorie consumption per day.

Method

The study was accomplished through the following steps:

1-Adminstrative process:

A formal permission to carry out this study was obtained from Faculty of Nursing directed to administrators of gastroenterology and nutrition pediatric department at Tanta Main University hospital to obtain their approval and collaboration in conducting this study.

2-Ethical and legal considerations:

Committee approval from faculty of nursing was obtained with scientific research ethics committee code **No 238 / 4 / 2023**. Mothers were informed about the confidentiality of the information obtained from them. The nature of the study didn't cause any harm or pain to the entire sample. Mothers' oral consents were obtained to participate in the study after providing appropriate explanation about the aims of the study. Mothers who agreed to participate were included in the present study, and they had the right to terminate participation from the study at any time.

3 -Tools development:

Two tools were utilized in the present study. Study tools were developed and modified based on the review of the related literatures.

4-Content validity:

The tools of the study were revealed to a jury of five experts in the field of Pediatric Nursing to check content validity and clarity of the questionnaire. Modifications were conducted accordingly. The face validity of the questionnaire was estimated based on experts 'opinion after calculating content validity index of its items and it was 99.1%.

5-Apilot study:

A pilot study was carried out on 10 % of the sample (6 mothers and their children) to test clarity; visibility and applicability of the study tools and the essential modification were done. The Pilot study was excluded from the study sample.

6- Reliability:

Reliability of the developed tool was tested through the internal consistency by using Cronbach's alpha coefficient test it was 0.81 for mothers ' knowledge, 0.863 for nutritional assessment and 0.80 for daily dietary intake indicating high reliability of tests.

7-**Phases of the study**: The present study was conducted on four phases:

I-Assessment Phase:

-The researcher carried out meeting with mothers, who participated in the study in order to explain the aim of the study, collect data about mothers and their infants to assess mothers' knowledge about non-organic failure to thrive by using (**tool I, II)**

2-Planning phase:

Educational program was planned according to mother's educational needs assessment and based on literature review which was included the following:

-Setting specific objectives of the educational program.

-Preparation of the content of educational program which was translated into Arabic.

-Different methods and materials of educational program were used including interactive lectures, group discussion, demonstration and video-based learning, pictures, books and posters

3- Implementation phase:

An educational program was carried out through conduction of successive sessions with every mother and child, they were divided into 10 subgroups, and each subgroup was attended three sessions and scheduled in the morning twice a week. The time for each session was about 30 – 45 minutes that was based on the response of the mother and the child condition.

The sessions covered the following topics:

-First session: It focused on definition, manifestations of children with non-organic failure to thrive.

-Second session: It focused on precipitating factors, causes, complications, management of nonorganic failure to thrive.

-Third session: It focused on instructions regarding daily dietary intake using the food guide pyramid such as the number of meals, snack types and forms of eating between meals consumption of fast food, carbonated beverages according age groups.

- Data was collected within one year. From July 2023 to June 2024.

4- Evaluation phase:

Evaluation of the effects of educational program on mothers' knowledge about non-organic failure to thrive was conducted using the same assessment tools (Tool I, II). Each mother was evaluated immediately and three months after implementing educational program.

Statistical analysis:

Recorded data were analyzed using the statistical package for social sciences, version (28). Quantitative data were expressed as mean± standard deviation (SD). Qualitative data were expressed as frequency and percentage. The following tests were done Chi-square test: For categorical variables, to compare between different groups. Paired t-test: For normally distributed quantitative variables, to compare

between two periods. Student t-test: For normally distributed quantitative variables, to compare between two categories-tests (ANOVA): For normally distributed quantitative variables, to compare between more than two categories. Pearson coefficient: To correlate between two normally distributed quantitative variables. Cronbach's Alpha: Reliability Statistics was assessed using Cronbach's Alpha test (**Beth, Robet, 2019**). The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, the p-value was considered significant as the following: **Probability (P-value):** P-value ≤ 0.05 was considered significant. P-value > 0.05 was considered insignificant.

Results

Table (1) shows socio-demographic characteristics of the studied mothers, it was revealed that, most of them (86.7 %) aged from 20 to less than 30 years, with Mean ± SD (26. 90 ± 4.003). It was found that, more than two thirds of the studied mothers (70.0%) had secondary education. Regarding mothers' occupation, it was noticed that majority of them (90%) were housewife.

Table (2) indicates socio-demographic characteristics of studied children. It was observed that, nearly two thirds of the studied children (63.3%) aged from 1 to less than 3 years with Mean ± SD (**2.80±1.286).** The study revealed that, most of them (80%) were males but only one fifth of them (20%) were females, 43.3%were the first children in the family.

Figure (1) illustrates the mean scores of total mothers' knowledge. It was noticed that, most of the studied mothers (80%) had low level of knowledge before program while 68.3%, 63.3% of them had high knowledge immediate and after three months of educational program respectively with significant improvement between before, immediately, and after three month of educational program implementation P (1) =0.000* P (2) =0.000* respectively.

Table (3) depicts percentage distribution of the anthropometric measurements of children with non-organic failure to thrive. It was noticed that, close to one third (30%) of children had low birth weight. Regarding to wight for age, it was noticed that, nearly two thirds (63.3%) of children had moderate underweight before educational program but they improved and decreased to be 51.7% after three months of educational program. There was

statistically significant difference between before, and after three months of educational program for weight according to children' age at P (2) = 0.000*.

Regarding to length or height 26.8% of children had severe stunted before program but they improved and decreased to be 21.7% after three months of educational program. There was statistically significant difference between before, and after three months of educational program for length or height according to children' age at P= 0.000*.

Table (4) presents percentage distribution of children concerning to their 24h daily dietary intake. It was noticed that, nearly two thirds (61.7%) of children had adequate daily requirement allowances of carbohydrate before educational program while after three months of program it improved to be 78.3% and only 30% of them had adequate daily requirement allowances of protein before educational program while after three months of program it improved to be 50.0%. Regarding fat daily requirement allowances, it was reported that 60.0% of children had adequate daily requirement allowances of fat before educational program while after three months of program it improved to be 75%. Also, it reported that all (100%) of children had not given adequate daily requirement allowances of energy (kcal/d) before educational program while after three months of program it improved to be 23.3% had adequate daily requirement allowances of energy. There was statistically significant difference between before and after three months of educational program implementation at p (2) =0.000*

Table (5) presents positive correlation between studied mothers' total knowledge and anthropometric measurements of their children with non-organic failure to thrive before, immediately & after three months educational program. The study showed that, there were statistically significantly correlation in (weight for age/ underweight, length or height/stature (r=0.537, p=0.000*), (r=0.328, p=0.010*) respectively.

Table (1): Percentage Distribution of the Studied Mothers regarding Socio-Demographic Characteristics:

Mothers' Characteristics	Studied Mothers (60)	
	No.	%
Age/ years		
20 <30	52	86.7
30 <40	6	10.0
≥ 40	2	3.3
Mean ±SD	**26.90±4.003**	
Educational level		
Illiterate/read and write	4	6.7
Preparatory education	10	16.6
Secondary education	42	70.0
University education	4	6.7
Occupation		
Working	6	10.0
Housewife	54	90.0
Residence		
Urban	18	30.0
Rural	42	70.0
Marital status		
Married	55	91.7
Divorced	3	5.0
Widow	2	3.3
Number of siblings in the family		
One	16	26.7
Two	18	30.0
Three	22	36.7
More than three	4	6.7
Income		
Not enough	38	63.3
Enough	22	36.7
Family type		
Nuclear	21	35.0
Extended	39	65.0

Table (2): Percentage Distribution of Children regarding Socio Demographic Characteristics:

Children's Characteristics	Studied Children (60)	
	No.	%
Age/ years		
<3	38	63.3
3-5	22	36.7
Mean ±SD	**2.80±1.286**	
Gender		
Male	48	80.0
Female	12	20.0
Birth order		
The first	26	43.3
The second	18	30.0
The third	14	23.3
More than the third	2	3.3

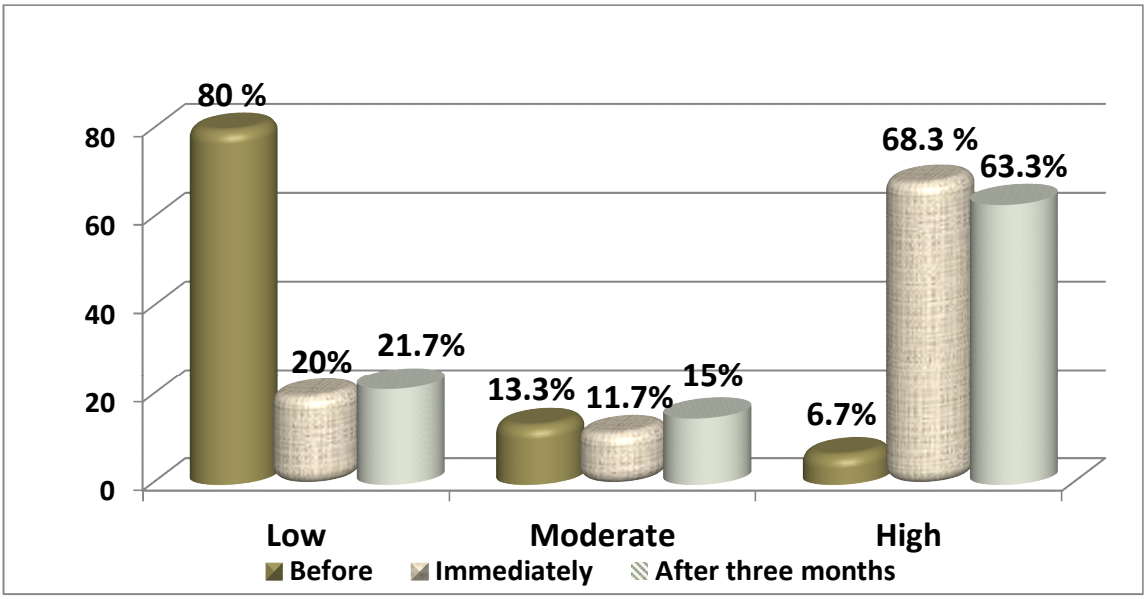

Figure (1): Mothers' Total Level of Knowledge about Non- Organic Failure to Thrive.

Table (3): Percentage Distribution of the Anthropometric Measurements of Children with Non- Organic Failure to Thrive.

Anthropometric measurements	Studied children (60)						Chi-square test		
	Before		Immediately		After three Months				
	No.	%	No.	%	No.	%	X^2 P1	X^2 P2	X^2 P3
Birth weight									
Normal	42	70.0							
Low < 2,500 gr	18	30.0							
Weight for age/ underweight Z score									
Mild (-1to -1.9)	4	6.7	4	6.7	14	23.3	5.305	59.321	1.845
Moderate (-2to-2.9)	38	63.3	39	65.0	31	51.7	0.275	0.000*	0.070
Sever (≤ -3)	18	30.0	17	28.3	15	25.0			
Length or height/stunted Z score									
Mild (-1to -1.9)	22	36.7	22	36.7	26	43.3	8.494	4.883	4.883
Moderate (-2to-2.9)	22	36.7	22	36.7	21	35.0	0.075	0.000*	0.000*
Sever (≤ -3)	16	26.8	16	26.8	13	21.7			

Chi-square test, * statistically significance p≤ 0.05, No statistically significance p> 0.05

Table (4): Percentage Distribution of the 24-hour Dietary Intake by Children with Non- Organic Failure to Thrive.

Dietary intake	Studied children (60)						Chi-square test / Paired t test		
	Before		Immediately		After three Months		X^2 P1	X^2 P2	X^2 P3
	No.	%	No.	%	No.	%			
CHO (gm/d)									
Adequate RDA	37	61.7	38	63.3	47	78.3	2.000 0.128	10.455 0.002*	16.430 0.000*
Less than RDA	23	38.3	22	36.7	13	21.7			
Mean ±SD (t-p-value)	52.700±11.177		53.058±11.015		59.17±7.833		0.191 0.849	4.628 0.000*	4.553 0.000*
Protein (gm/d)									
Adequate RDA	18	30.0	19	31.7	30	50.0	2.674	5.079	3.774
Less than RDA	42	70.0	41	68.3	30	50.0	0.089	0.024*	0.047*
Mean ±SD (t-p-value)	17.38±4.603		17.70±4.691		20.07±5.90		0.392 0.697	3.543 0.001*	3.239 0.002*
Fat(gm/d)									
Adequate RDA	36	60.0	37	61.7	45	75.0	2.303	18.148	6.792
Less than RDA	24	40.0	23	38.3	15	25.0	0.106	0.000*	0.011*
Mean ±SD (t-p-value)	30.933±10.072		31.133±9.992		34.100±10.375		0.122 0.903	2.730 0.008*	1.937 0.058
Energy (kcal/d)									
Adequate RDA	0	0.0	0	0.0	46	76.7	-	-	-
Less than RDA	60	100.0	60	100.0	14	23.3			
Mean ±SD (t-p-value)	508.37±159.786		508.52±159.894		693.83±382.631		0.009 0.993	4.331 0.000*	4.182 0.000*

Chi-square test, Paired t test, * statistically significance p≤ 0.05, No statistically significance p> 0.05

Table (5): Correlation between Studied Mothers' Total Knowledge and Anthropometric Measurements of their Children with Non- Organic Failure to Thrive.

Children Anthropometric Measurements		The studied Mothers		
		Total Knowledge		
		Before	Immediately	After three months
Weight for age/ underweight	r	0.402	0.027	0.537
	P	0.001*	0.838	0.000*
Length or height/stature	r	0.162	0.003	0.328
	P	0.216	0.984	0.010*

Pearson Correlation Coefficient, * statistically significance p≤ 0.05

Discussion

Failure to Thrive (FTT) is an abnormal growth pattern determined by insufficient nutrition and an imbalance between requirements and energy intake. The most frequent cause is insufficient caloric intake, but other potential causes include excessive metabolism or insufficient nutrient absorption. The first indicator of FTT is difficulty achieving or maintaining a healthy weight. In serious cases, undernutrition can result in abnormal head circumference, height, and cognitive or immunological impairment. Enhancing mothers' knowledge about failure to thrive is important for improving their practices when caring for their infants with failure to thrive. **Lezo, Baldini &Asteggiano (2020).**

Regarding the socio-demographic characteristics of mothers, the current study showed that, almost two thirds of the studied mothers, their educational level was secondary education. From the researcher point of view, this may be due to the majority of mothers were from rural areas that characterized with low economic status and not concerned with girls' education and mothers who had secondary education not have enough knowledge about failure to thrive. This finding was in aligned with **Hasan & Fatema (2020)** who observed that, the maximum of the studied mothers had secondary education. Concerning age of the studied mothers, the study showed that, the majority of the studied mothers their age was from twenty to less than thirty. From the researcher point of view, the lack of maternal experience in this young age group. So, mothers who were less than thirty years not have enough knowledge about failure to thrive to enhance their practice regarding care of their children with failure to thrive. This finding was in aligned with **Zakaria, El Sayed & Elsayed (2023)** who reported that, more than half of the studied mothers their age were less than thirty years.

Concerning the job of the studied mothers, almost of the studied mothers not working and housewife, from the researcher point of view, this may be explained by the fact that the prevalence of FTT varies depending on population factors, such as poverty, infectious diseases, low-income settings, and poor nutrition. **El-Asheer, Shafek, Abdel-Hafez, & El Gendy (2022)** agreed with the current study.

Regarding the socio-demographic characteristics of studied children, the current study revealed that, nearly two thirds of them aged from one to less than three years. From a viewpoint of the researcher, children under the age of four years are more susceptible to malnutrition. As their bodies require adequate nutrients for growth and development, in addition, they are more susceptible to illnesses that might eventually cause malnutrition **Afolabi, Ogunwale& Aiyesetenikan (2020)** agreed with this and revealed that, the age of 24 months or less was associated with malnutrition. Moreover, **Kassie& Workie (2020**) who reported that children under the age of four years old had a significant frequency of malnutrition.

Concerning the sex of the studied children, it was found that the majority of studied children were males, and the others were females. From the researcher point of view, the female children had a weight advantage than male peers at all regarded as quantiles. The result of the present study was secured by **Thurstans et al., (2020)** who found that, undernutrition in children under five years is more likely to affect male than females, male children had higher odds of being wasted than females. Regarding total scores of mothers' knowledges, the present study showed that, most mothers had poor level of knowledge about non-organic failure to thrive before educational program while immediately after educational program, mothers' knowledge improved and the majority of them obtained good scores. But three months after educational program, the total scores of mothers` knowledge still improved but slightly reduced to about two thirds of them. From the researcher point of view, this could be attributed to lack of simple Arabic references about non-organic failure to thrive, low mother's educational attainment,

limited qualifications of nurses, no available time for physician and nurses to provide mothers with proper knowledge. While immediately improved mothers' knowledge due to the content of educational program. This finding was supported by **Sadiq, Adai & Hussein (2020**) who mentioned that two thirds of the studied mothers were categorized as having low knowledge before educational program while majority of the mothers have good knowledge about pre-school children nutrition after educational program.

Regarding anthropometric measurements the current study showed that, nearly one third of studied children with a low birth weight experienced more growth failure compared to those who had normal birth weight. From the researcher point of view, this could be attributed to children with low birth weight are more liable to diseases, experience breastfeeding failures more frequently, and are at a higher risk of growth problems, as in contrast to children with appropriate birth weight. This finding was confirmed and supported by the study of **Ntenda (2019)** who found that there is a significant relationship between children's birth weight and malnutrition. Children with low birth weight have the highest risk of malnutrition.

In relation to weight for age**,** the current study found that, nearly one third of the studied children had severe undernutrition. From the researcher's point of view, In Egypt food insecurity is linked to poor eating habits, a lack of nutritional awareness among the general public, and limited access to a balanced diet for the lowest segments of society.

These results were in the same line with the research done by **Li, Kim; Vollmer& Subramanian (2020)** who noticed that more than one quarter of the studied children were underweight. In relation to height for age**,** nearly more than one quarter of the studied children had severe stunting. From the perspective of the researcher, it confirmed a lack of health awareness among mothers inappropriate feeding practices, lack of dietary diversity, and insufficient complementary feeding practices. This was consistent with a study conducted by **George & Murthy (2021)** who found that, nearly one quarter of the studied children were stunting among the studied children. Also, **Elmighrabi, Fleming &Agho (2024)** which studied "Factors Associated with Childhood Stunting in Four North African Countries found the same results and found that, Stunting was more prevalent among children from Sudan and Egypt.

Regarding daily dietary intake**,** the present study reported that, almost of the studied children had not taken adequate requirement of daily allowance of energy (kcal/d). From the researcher point of view, this can be attributed to the low intake of nutrients needed for growth. Insufficient calorie intake is the most frequent cause of FTT. The current study's findings were supported by

Khalili, Teimouri& Babaeian (2023) who found in their study prevalence of Failure to Thrive and associated risk factors in in-patients under 5 years of age, that the most common cause of FTT is not taking enough calories, poor feeding practices, low birth weight, and residence in rural areas. are the risk factors that could lead to malnutrition. In this study, the majority of the studied children had less than adequate requirement of daily allowance of protein (gm/d). From point view of the researcher, this may be related to most mothers had in adequate income and had poor socioeconomic status which indicates the burden of this factor on nutritional status of children. These findings are supported by the results of **Vega& Fewtrell (2024)** who found that, inadequate protein consumption is associated with FTT occurrences. Long-term protein deficiency will cause disturbances in body and growth hormone regulation, which can cause nutritional problems such as FTT. In the current study, more than one third of the studied children had less than adequate Requirement of Daily Allowance (RDA) of carbohydrate CHO (gm/d), from the researcher point of view, macronutrient deficiency in children is related to insufficient intake of nutrients. These results are supported by the study of **Von Salmuth et al., (2021)** who clarified that, carbohydrates are the primary provider of energy.

Regarding correlation between studied mothers' total knowledge and anthropometric measurements of their children with non-organic failure to thrive, the current study showed that, there is a statistically significantly correlation in (weight for age/ underweight, length or height/stature. From the researcher point of view, mothers with above primary level education can significantly decrease stunting and wasting in children. This was in line with **El-Nmera, Salamab & Elhawaryc (2021)** in their study reported that, maternal nutritional knowledge is positively associated with the nutritional status of children

Conclusion

It was concluded that mothers` knowledge in relation to care of children with non-organic failure to thrive were improved after implementation of an educational program.

Recommendations:

-Conducting in-service educational program about nonorganic failure to thrive to nurses and mothers at pediatric outpatient endocrine clinic to

improve their knowledge regarding non-organic failure to thrive.

-Educational booklet and handouts about care of children with nonorganic failure to thrive should be available in endocrine clinic to mothers and nurses as a reference.

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