Original Research Article

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Nutritional survey among under five children at Tamyia district in Fayoum, Egypt

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ABSTRACT

Background: Malnutrition is involved in half of the deaths of under-five children as in many developing countries. In Egypt, malnutrition remains an important issue as 5.5% of under-five children are underweight, 8.4% are wasted and 21.4% are stunted. The present study was carried out to assess the prevalence and risk factors of malnutrition among sick under five children seeking medical advice at Tamiya District health care facilities in Fayoum.

Methods: This cross-sectional descriptive study included 400 under five children at Tamiya district in Fayoum. It was carried out over a period of 5 months from June to October 2014. All patients were subjected to the following: History taking, anthropometric measurements including weight and length/height.

Results: Our study shows that 23.2%, 18.5% and 19.3% of children were underweight, stunted and wasted, respectively. Stunting was more common in females than males. Also, our results reveal that risk factors of malnutrition were 70.6% parasitic infestation and 15.7% for gastroenteritis with statistically significant high prevalence of positive parasitic, helminthic infestation, and gastroenteritis with p-value <0.05 among wasted, stunted, and underweighted children.

Conclusions: Prevalence of malnutrition was high among under five sick children. These findings indicate the need for implementing hospital and community-based intervention nutritional program.

Keywords: Malnutrition, Underweight, Wasting, Stunted, Under-five children

INTRODUCTION

Globally, under-nutrition, which refers to both proteinenergy malnutrition and micronutrient deficiency, is the cause of around 3.1 million child deaths annually in lowand middle-income countries. Protein-energy malnutrition in children is clinically classified as marasmus (severe thinness), kwashiorkor (bilateral pitting edema), and marasmus kwashiorkor (mixed condition). Three anthropometric indices are used to define child nutritional status: weight-for-height, heightfor-age, and weight-for-age. For any one of these indices, malnutrition is defined as a Z-score below -2.0.² There are two forms of acute malnutrition/wasting:

- Severe acute malnutrition (SAM), defined as weightfor-height below -3.0 Z-scores of the median World Health Organization (WHO) standards in children 6– 59 months of age, and/or mid-upper arm circumference (MUAC) less than 11.5 cm, and/or the presence of bilateral pitting edema.
- 2) Moderate acute malnutrition (MAM), defined as weight-for-height \geq -3.0 Z and \leq -2.0 Z-scores, or MUAC \geq 11.5 cm and \leq 12.5 cm and no edema.

Approximately 19 million children under 5 years are affected by SAM and 33 million by MAM.³ An estimated 2 to 2.5 million of them die annually, of which 0.5 to one million deaths are attributed to SAM.^{4,5} Acute malnutrition is the result of an acute decrease in food intake often combined with illness, anorexia, poor appetite, and sometimes medical complications, leading to rapid weight loss or failure to gain weight. Stunting or chronic malnutrition results from inadequate nutrition, care, and health, over the long period of time, leading to failure of linear growth and poor development. It does not usually pose an immediate threat to life but it is associated with chronic disease risk in the long-term.⁶⁻⁸

The prevalence of global acute malnutrition is 13.5%, representing about 2.2 million children, of which 10.1% suffer from MAM and 3.4% (about 500,000 children) suffer from SAM at any one time. Malnutrition is involved in half of the deaths of under-five children as in many developing countries (Camille et al). In Egypt, malnutrition is a major health problem as 5.5% of underfive children are underweight, 8.4% are wasted and 21.4% are stunted. In

Objectives

The present study was carried out to assess the prevalence and risk factors of malnutrition among underfive children at Tamiya District in Fayoum.

METHODS

This study was a cross-sectional observational study. It was carried out over a period of 5 months from June to October 2014.

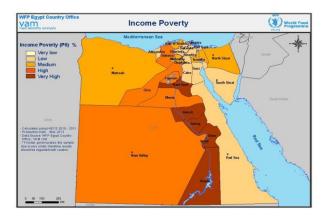


Figure 1: Income poverty in Egypt governorate (WFP, 2013).

Our study was conducted in at Tamiya District in Fayoum. Tamiya District was selected from six district hospitals in Fayoum as it represents one of the poorest districts in Fayoum which considered as a high poverty area in Egypt (Figure 1).¹¹ Fayoum Governorate is a developing city in Middle Egypt, 100 kilometers (62)

miles) southwest of Cairo. The total population of Fayoum is 3.170.150 inhabitants in January 2015 with 22.5% urban and 77.5% rural population according to Central Agency for Public Mobilization and Statistics. ¹²

A sample size of 424 was calculated using Epi info 7 based on expected prevalence of malnutrition, around 50% (with 95% confidence interval and precision of 5%) in order to get the maximum sample size. Finally, the sample was increased by 10% to overcome the problem of non-response and missing data. Ultimately, 400 children were recruited by multistage random sample, first stage was stratified random sample of health care facilities to select two primary health care units, two primary health care centers, and one district hospital; second stage was systematic random sample choosing every third eligible patient attending health care facilities with a response rate of more than 90%. The eligibility criteria were as following all children aged less than five years of both sexes attending health care facilities. Exclusion criteria were hospitalized children, children with chronic diseases, or children who were too restless and unwilling for anthropometric measurements.

Data collection

1- Questionnaire form

Socio-demographic information including age and sex alongside with present history for the medical problems for which patient is seeking medical advice were collected by interviewing mothers using a pre-prepared and pretested structured questionnaire.

2- Anthropometric measurements

Weight measurement_Young children <2 years old were weighed on a sensitive baby scale where they were weighed in light clothing and the record was taken to the nearest 0.1 kg. The weight of older children >2 years old was taken using the digital electronic scale and the record was taken to the nearest 0.1 kg.

Height measurements were done in the recumbent position (i.e. length) for children <2 years of age using wooden length board (Infantometer). Standing height was done for others above 2 years old by (Stadiometer), the record was taken to the nearest 0.1 cm.

Data analysis

The collected data was organized, tabulated and statistically analyzed using SPSS software statistical computer package version 18 (SPSS Inc, USA). For quantitative data, the mean and standard deviation were calculated. Independent t-test was used as the test of significant. For qualitative data, the number and percent distribution was calculated and chi-square (χ^2) was used as a test of significance. For interpretation of results of tests of significance, significance was adopted at P \leq 0.05.

Nutritional data were analyzed using WHO Anthro for personal computers, version 3.2.2, 2011. The height and weight of each child were compared with the WHO child growth standards, 2006 reference data for that particular age and sex to get the weight for age, height for age and weight for height indices. Children below two standard deviations of the reference median on any of these indices were considered as malnourished and termed as underweight, stunted and wasted respectively (WHO, 2006).²

Ethical consideration

This study was reviewed by the Faculty of Medicine Research Ethical committee. The researcher informed the participants about the objectives of the study, the examinations, investigations that would be done, also the confidentiality of their information and their right not to participate in the study.

RESULTS

Age of study children ranged from 1 to 54 months with mean \pm SD of 26.09 \pm 12.88 months. 256.0 (64%) of

children were at age group (<2 years), 144 (36%) were at (≥ 2 years). As regards sex, 137.0 (34.2%) were females and 263.0 (65.8%) were males. There was no significant difference between male and female as regards their age (26.8 ± 12.5 vs. 24.8 ± 13.6).

Results related to anthropometric measurements shows that the mean \pm SD of weight for age Z-score was -0.47 \pm 1.59. Prevalence of underweight was 23.2% (95% CL= 19.1-27.3). Regarding height, the mean \pm SD of Z-score of height for age was -0.83 \pm 1.28. Prevalence of stunting was 18.5% (95% CL= 14.7-22.3). The mean \pm SD of Z-score of weight for height was - 0.12 \pm 1.86 with the prevalence of wasting of 19.3% (95% CL= 15.4-23.2).

There was the statistically significant difference between males and females regarding Z-score of height for age (-0.63 ± 1.19 vs. -1.20 ± 1.37) and the Z score of weight for age (-0.35 ± 1.55 vs. -0.72 ± 1.64), p <0.05. Also, there was the statistically significant difference between males and females as regards prevalence of stunting with p<0.05 (12.5% for males vs. 29.9% for females). On another hand, no statistically significant difference in other anthropometric measurements was found between males and females, p>0.05, Table 1.

Table 1: Differences in anthro	pometric measurement	as regards sex of children.

Variable	Male	Female	Darohas	
	Mean ± SD	Mean ± SD	P-value	
Weight (kg)	11.41±2.03	11.11±2.04	0.162	
Height/length (cm)	84.90± 9.33	82.95 ± 10.29	0.056	
Weight for height Z score	- 0.06±1.84	- 0.23±1.91	0.397	
Height for age Z score	- 0.63±1.19	- 1.20±1.37	< 0.0001*	
Weight for age Z score	- 0.35±1.55	- 0.72±1.64	0.028*	
Variable	N (%)			
Weight for height				
Normal	215 (81.7)	108 (78.8)	0.330	
Wasting	48 (18.3)	29 (21.2)		
Height for age				
Normal	230 (87.5)	96 (70.1)	< 0.0001*	
Stunting	33 (12.5)	41 (29.9)		
Weight for age				
Normal	208 (79.1)	99 (72.3)	0.080	
Underweight	55 (20.9)	38 (27.7)	0.000	

^{*} Significant p-value <0.05.

There were statistically significant differences in Z-score weight for height, and Z-score weight for age indices according to different age group, p <0.05, with low mean among older children. Correspondingly, there was the statistically significant difference between different age groups as regards prevalence of wasting and underweight with p <0.05. The prevalence of wasting and underweight increased significantly with increase age in Table 2.

On the other hand, there are no significant differences with p-value >0.05 between age groups as regards Z-score height for age, and prevalence of stunted in Table 2.

The present study reveals that out of 102.0 children with malnutrition, 72.0 (70.6%) children having the history of parasitic infestation, 16.0 (15.7%) having the history of gastroenteritis. 8.0 children (7.8%) had improper weaning and 5.0 (5.9%) had other causes as respiratory infections and bronchial asthma, Figure 2.

Results revealed statistically significant high prevalence of positive parasitic and helminthic infestation, and gastroenteritis with p-value <0.05 among wasted, stunted, and underweighted children with percentage of (54.4%), (35.1%), and (58.1%) for parasiticand helminthic infestation, (13.0%), (10.8%), and (12.9%) for gastroenteritis respectively in Table 3.

Table 2: Anthropometric measurements in relation to age of children.

	Age groups			
Variable	<2 years (n=256)	≥2 years (n=144)	P-value	
	Mean \pm SD Mean \pm SD			
Weight for height Z score	0.49±1.7	-1.20±1.6	<0.001*	
Height for age Z score	-0.76±1.3	-0.93±1.3	0.198	
Weight for age Z score	0.0034±1.6	-1.3±1.2	<0.001*	
Variable	N (%)			
Weight for height				
Normal	224 (87.5)	99 (68.8)	<0.001*	
Wasting	32 (12.5)	45 (31.3)		
Height for age				
Normal	215 (84)	111 (77.1)	0.059	
Stunting	41 (16)	33 (22.9)		
Weight for age				
Normal	209 (81.6)	98 (68.1)	0.003*	
Underweight	47 (18.4)	46 (31.9)		

^{*} Significant p-value <0.05.

Table 3: Differences in anthropometric measurement as regards common risk factors of malnutrition.

	Risk factors o	f malnutrition				
Variable	Parasitic infestation		Gastroenteritis		Improper weaning	
	-ve	+ve	-ve	+ve	-ve	+ve
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Weight for height						
Normal	293 (90.7)	30 (9.3)	317 (98.1)	6 (1.9)	321 (99.4)	2 (0.6)
Wasting	35 (45.5)	42 (54.5)	67 (87)	10 (13)	71 (92.2)	6 (7.8)
P-value	<0.001*		<0.001*		0.001*	
Height for age						
Normal	280 (85.9)	46 (14.1)	318 (97.5)	8 (2.5)	320 (98.2)	6 (1.8)
Stunting	48 (64.9)	26 (35.1)	66 (89.2)	8 (10.8)	72 (97.3)	2 (2.7)
P-value	<0.001*		0.004*		0.645	
Weight for age						
Normal	289 (94.1)	18 (5.9)	303 (98.7)	4 (1.3)	307 (100.0)	0 (0.0)
Underweight	39 (41.9)	54 (58.1)	81 (87.1)	12 (12.9)	85 (91.4)	8 (8.6)
P-value	<0.001*		<0.001*		<0.001*	

^{*} Significant p-value <0.05.

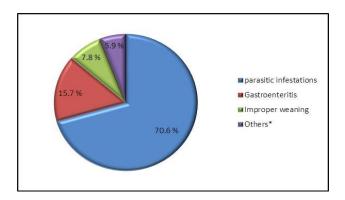


Figure 2: Frequency (%) of different risk factors of malnutrition.

Others*: Bronchial asthma and acute respiratory infections. On the other hand, there was the high statistically significant prevalence of improper weaning among wasted and underweighted children with the percentage of and (7.8%), and (8.6%) but no statistical significance difference as regards stunted children with p-value >0.05 in Table 3.

DISCUSSION

In Egypt, despite the considerable number of nutrition interventions carried out in recent years to address malnutrition in the country, malnutrition remains an important issue. The various aspects of malnutrition among children under five in Egypt were addressed mainly through community-based studies. The last Egypt Demography and Health Survey (EDHS) were conducted in 2014. Also, some research to assess the status of malnutrition among children in different communities in Egypt was identified through studies. ^{13,14} It is important

to further assess the status of malnutrition among hospital-based populations, as outcome and prognosis of the disease are dramatically affected by nutritional status especially among children. The present study focused on evaluating the prevalence and risk factors of malnutrition among children below five years attending health care facilities at Tamiya district that serves a large number of populations of both urban and rural areas. Services provided in these health facilities included accident and emergency, general medical and surgical care.

Our study showed that 23.2%, 18.5% and 19.3% of children were underweight, stunted and wasted, respectively. These findings were higher than results of EDHS conducted in 2014 as regards underweight and wasting which showed that 5.5% of children under five were underweight and 8.4% were wasted. On the other hand, as regards stunting, EDHS data revealed that 21.4% of sampled children were stunted which was comparable with our results. 10 Also, our results were higher than those of study conducted amongst children below five years in the rural area in Beni-suef Governorate in Egypt which illustrated that 17.0%, 16.6%, and 17.9% were wasted, stunted and underweight. As well, our figures were higher than those in the results of the study done in Alexandria community of children under five. In that population, 3.6%, 15.0%, and 7.3% were wasted, stunted and underweight. ¹³ The fact that population presenting at the hospital has greater malnutrition than the general population, also Fayoum governorate ranked as the fourth governorate in poverty in Egypt especially Tamia district.

A study carried out amongst children under five in Peru revealed that 6.5% were wasted. Also, a study conducted in Nigeria reported that 9.7% of children below five years were wasted and 9.9% were stunted. These findings were much lower than our results; this may be due to differences between the two communities as regards socioeconomic status, environmental and cultural characteristics as poor weaning practices and delay in seeking medical advice. On the other hand, findings regarding stunting and underweight in Peru were much higher than our figures as they found that 42.1% and 31.6% of preschool children were stunted and underweight.

The current study revealed that underweight and stunting were more common in females than males that because of the sex discrepancy in rural population as they gave more care to males children than females, these findings were consistent with.¹⁷ Our finding disagreed with the results of; which revealed a no difference in sex as regards prevalence of stunting or underweight.¹⁴⁻¹⁶ But a study conducted in Vietnam stated that male children were more exposed to the risk of underweight and stunting than female.^{18,19}

Our results illustrated that prevalence of wasting and underweight increased with age; these results were in agreement with Beni-suef study but conflicted with a study conducted in Nigeria which revealed that highest proportion of wasting was found in an infant.¹⁴ The researcher stated that high rates of wasting and underweight observed after two years old age might be linked to inappropriate food supplementation during the weaning period to stopping breastfeeding, and poor quality of complementary feeding of children.¹⁶

According to the relation between age and prevalence of stunting, the current research illustrated that no statistical significant; this finding was not consistent with Beni-suef study which revealed that prevalence of stunting was more prevalent among infants. ¹⁴ Also, a study done in Ethiopia showed that the highest risk of stunting was among children age 12-23 months and 36-47 months. ²⁰

In our study, the most prevalent causes of malnutrition among malnourished children were helminthes and parasitic infestation, followed by gastroenteritis and improper weaning. The current study revealed that these causes were statistically associated with wasting, stunting, and underweight, these results were agreed with studies concluded in Alexandria, Malaysia, and The Peruvian Amazon that high socioeconomic and good environmental conditions were the most important factors associated with the lower prevalence of malnutrition. ^{13,21,22}

Study conducted in Sub – Saharan Africa reported that parasitic infestation had serious impact on children nutritional status and considered as a root cause of malnutrition, but study conducted in the Peruvian Amazon reported that the most prevalent cause of malnutrition in preschool children was lead poisoning due to oil extraction. ^{15,17}

What this paper adds

- The Prevalence of hospital-based malnutrition is evaluated.
- The Prevalence of malnutrition assessed in study identifies the impact of poverty on children nutritional status.
- Sex discrimination had an impact on nutritional status of children.
- Parasitic infestation, gastroenteritis, and improper weaning were the main risk factors for malnutrition.

Limitation of study

There were some limitations encountered due to its being a cross-sectional study; therefore, the results provide suggestions about the risk factors that may be associated with malnutrition, for which there was no proof found. As a self-admitted limitation in our research, there were many factors that may have worked as confounders, as a residence, educational level and occupation of parents and socioeconomic status of the family. Malnutrition is a multidisciplinary problem affected by socio-demographic

characters, personal behavior, and epidemiology of the disease, healthcare facilities, and healthcare programs.

CONCLUSION

Malnutrition was relatively high in under five sick children especially among female children and it increased with growing in age. The main risk factors for malnutrition were a parasitic infestation, gastroenteritis, and improper weaning. These findings reflect the dire necessity to strength the role of public health in implementing nutritional interventions at the level of hospitals, in parallel to community-based interventions.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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