Assessment of Nutritional Status for Preschool Children (From 3-6 Years)

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Abstract: Objective: To determine the nutrient intakes and status of preschool children from a representative population sample in governorate and public nurseries. **Background:** Nutritional status of Preschool children was deteriorated in the last years. **Methods**: A cross sectional study was performed to simple random sample of 500 preschool children from governorate and public nurseries in Cairo governorate Data were collected by interviews with the primary caregivers with their children, Weight, height, mid arm circumference and triceps skin fold thickness were measured to the children also dietary assessment like 24 hours recall and food frequency questionnaire and biochemical investigation were done. **Results**: A total of 500 children were assessed, of whom 16.8%, 32.6%, and 17.8% were wasted, stunted, and underweight, respectively, the prevalence of stunting and underweight is higher in males than females while wasting is higher in females than males. (19.8%) of females and (18.2%) of males consumes below 50% of total caloric intake which is unsafe level of consumption. CHO intake, (33.6%) of males and (43.5%) of females consumes below 55% of total caloric intake and about half of children reach to recommended daily intake form 55% to 70%. The majority of males (96%) and females (92.1%) take > 120% of RDA of proteins. fat intake, (60.3%) of males and (58.5%) of females consumes below 20% of total calories and (30%) of males and (37.5%) of females consumes more than 30% of total caloric intake. **Conclusions**: The nutritional status of studied children was significantly lowered with increase family numbers, inappropriate feeding practices and Socio-economic level.

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Key Words: Nutritional status, Underweight, Obesity, Stunting, Caloric intake

1.Introduction

Nutritional status is the balance between the intake of nutrients by an organism and the expenditure of these in the processes of growth, reproduction, and health maintenance. Nutritional status can be measured for individuals as well as for populations **(1)**. Assessment of nutritional status stands for anthropometric measurement, laboratory tests, and dietary assessment. Anthropometric approaches are, for the most part, relatively noninvasive methods that assess body weight and height. The most recent classification is to use body mass index in kg/m^2 **(2)**. In children, growth charts have been developed to allow researchers and clinicians to assess weight-and height-for-age, as well as weight-for-height. For children, low height-for-age is considered stunting, while low weight-for-height indicates wasting. In addition to weight and height, measures of mid-arm circumference and skin fold measured over the triceps muscle at the mid-arm are used to estimate fat and muscle mass. Several techniques exist for collecting dietary data with which to estimate nutritional status **(3)**. The most valid, or accurate, dietary methods are prospective methods. These involve keeping records of foods consumed over the period of time of interest. This can be done by individuals themselves, or by others observing them. Another method is the dietary record, in which the subject records estimated amounts of foods consumed. Twenty four hour Recall method is the most widely used type of dietary data collection in which the subject tells the observer about all food staffs and beverages that he eats and drinks in the last 24 hours (last day) in this method, the person cannot deceive the observer because he does not knew the date under research **(4)**.

2. Subjects and Methods

A cross sectional study design which will be implanted in (private and governmental) schools, Cairo Governorate, Male and female preschool children in the age group 3 to 6 years. A Sample of (500 child) will be chosen from kindergarten children of equally divided numbers from (governmental and private) schools and the following steps will be done:

The researcher will interview mothers or caregivers of the chosen children to fill a questionnaire include: Child age, sex, family size,

education and occupation of both parents, etc. Anthropometric measurements of the child which including: Weight, height, Body mass index upper, mid arm circumference and triceps skin fold thickness.

Laboratory tests including, Hemoglobin percentage (Hb%) and serum albumin for suspected cases of malnutrition and dietary assessment which represents diet history includes all foods that the child eats daily and this will be done by the help of the mother of every child.

3.Results

- The prevalence of stunting (Height-age Z score < -2) was (32.6%) of studied children, while underweight (Weight-age Z score < -2) was (17.8%). On the other hand percent of obesity (Weight-Height Z score > +2) was (15%).
- Mother illiteracy don't increase prevalence of Height-age Z score < -2 (P=0.000) and significantly don't increase Weight-age Z score < - 2 (P =0.000). Same for father illiteracy which was significant (P =0.000) in both Weight-age and Height-age.
- Obesity in a child of high class families is highly significant (P =0.000).
- stunting is more in 1st and 2nd child and in families which have less than 5 persons and also in middle socio-economic class which statistically has high significant difference (P =0.001).
- wasting is more in 1st and 2nd child and in families which have less than 5 persons and also in middle socio-economic class which statistically has high significant difference (p=0.000).
- 25.6% of studied children were suffer from anemia (p =0.328).
- Regarding to daily caloric intake below 50%, (19.8%) of females while (18.2%) of males which is unsafe level of consumption. While males are equal females regarding to adequate level of consumption ≥ 100-120% which is statistically insignificant.
- Regarding to RDA of macro minerals like calcium it was found that one third of males consume less than 50% of daily requirements and about (13.8%) which reach to acceptable level of consumption the lower is the females about half of them consume below than 50% of RDA of calcium and just (4%) who intake acceptable level of consumption this all is highly significant (p =0.000).
- Regarding to RDA of some micro minerals like iron, about (20.2%) of males and (17.8%) of females consume lower than 50% of RDA while (13.8%) of males and (7.9%) of females take normal level of consumption which is highly significant (p =0.000).
- Regarding to CHO intake, (33.6%) of males and (43.5%) of females consumes below 55% of total caloric intake and about half of children reach to recommended daily intake form 55% to 70% which statistically insignificant.
- Regarding to fat intake, (60.3%) of males and (58.5%) of females consumes below 20% of total calories and (30%) of males and (37.5%) of females consumes more than 30% of total caloric intake which statistically insignificant.

Table (1): Percent Energy Distribution from Macronutrients per Sex

Nutrient	Sex					
	Male		Female		Total	
	No	%	No	%	No	%
I. Protein Energy Ratio:						
< 10%	**5**	**2.0**	**35**	**13.8**	**40**	**8.0**
≥ 10-15%	**50**	**20.2**	**44**	**17.4**	**94**	**18.8**
≥ 15%	**192**	**77.7**	**174**	**68.8**	**366**	**73.8**
***P* = 0.000**						
II. Carbohydrate Energy Ratio:						
< 55%	**83**	**33.6**	**110**	**43.5**	**193**	**38.6**
≥ 55-70%	**139**	**54.1**	**118**	**46.6**	**257**	**51.4**
≥ 70%	**25**	**10.1**	**25**	**9.9**	**50**	**10.0**
***P* = 0.066**						
III. Fat Energy Ratio						
< 20%	**149**	**60.3**	**148**	**58.5**	**297**	**59.4**
≥ 20-30%	**24**	**9.7**	**10**	**4.0**	**34**	**6.8**
≥ 30%	**74**	**30.0**	**95**	**37.5**	**169**	**33.8**
***P* = 0.016**						

Table (2): Distribution of Studied Sex according to their Dietary Adequacy from Calories, Protein, and Macro-minerals

Nutrient	Sex					
	Male		Female		Total	
	No	%	No	%	No	%
Calories						
< 50%	45	18.2	50	19.8	95	19.0
≥ 50-75%	55	22.3	45	17.8	100	20.0
≥ 75-100%	55	22.3	50	19.8	105	21.0
≥ 100-120%	34	13.8	35	13.8	69	13.8
≥ 120%	58	23.5	73	28.8	131	26.2
P =NS						
Protein						
≥ 75-100%	1	4.0	0	0.0	10	2.0
≥ 100-120%	0	0.0	20	7.9	20	4.0
≥ 120%	237	96.0	233	92.1	470	94.0
P = 0.000						
Calcium						
< 50%	80	32.4	115	45.5	195	39.0
≥ 50-75%	60	24.3	54	21.3	114	22.8
≥ 75-100%	49	19.8	30	11.9	79	15.8
≥ 100-120%	34	13.8	10	4.0	44	8.8
≥ 120%	24	9.7	44	17.4	68	13.6
P = 0.000						
Magnesium						
< 50%	60	24.3	114	45.1	174	34.8
≥ 50-75%	60	24.3	50	19.8	110	22.0
≥ 75-100%	54	21.9	40	15.8	94	18.8
≥ 100-120%	34	13.8	14	5.5	48	9.6
≥ 120%	39	15.8	35	13.8	74	14.8
P = 0.000						
Potassium						
< 50%	149	60.3	160	63.2	309	61.8
≥ 50-75%	64	25.9	44	17.4	108	21.6
≥ 75-100%	25	10.1	29	11.5	54	10.8
≥ 100-120%	0	0.0	15	5.9	15	3.0
≥ 120%	9	3.7	5	2.0	14	2.8
P = 0.000						
Sodium						
< 50%	15	6.1	10	4.0	25	5.0
≥ 50-75%	15	6.1	15	5.9	30	6.0
≥ 75-100%	35	14.2	40	15.8	75	15.0
≥ 100-120%	10	4.0	15	5.9	25	5.0
≥ 120%	172	69.6	173	68.4	345	69.0
X^2 = 2.27 df = 4 P =NS						

Table (3): Distribution of Studied Sex according to their Dietary Adequacy from Micro-minerals

Nutrient	Sex					
	Male		Female		Total	
	No	%	No	%	No	%
Iron						
< 50%	50	20.2	45	17.8	95	19.0
≥ 50-75%	35	14.2	80	31.6	115	23.0
≥ 75-100%	59	23.9	50	19.8	109	21.8
≥ 100-120%	34	13.8	20	7.9	54	10.8
≥ 120%	69	27.9	58	22.9	127	25.4
P = 0.000						
Zinc						
< 50%	15	6.1	10	4.0	25	5.0
≥ 50-75%	25	10.1	50	19.8	75	15.0
≥ 75-100%	30	12.1	60	23.7	90	18.0
≥ 100-120%	35	14.2	10	4.0	45	9.0
≥ 120%	142	57.5	123	48.6	265	53.0
P = 0.000						
Selenium						
< 50%	0	0.0	15	5.9	15	3.0
≥ 50-75%	0	0.0	5	2.0	5	1.0
≥ 75-100%	15	6.1	15	5.9	30	6.0
≥ 100-120%	15	6.1	0	0.0	15	3.0
≥ 120%	217	87.9	218	86.2	435	87.0
P = 0.000						
Copper						
< 50%	35	14.2	45	17.8	80	16.0
≥ 50-75%	45	18.2	45	17.8	90	18.0
≥ 75-100%	39	15.8	30	11.9	69	13.8
≥ 100-120%	24	9.7	20	7.9	44	8.8
≥ 120%	104	42.1	113	44.6	217	43.4
P = NS						

Table (4): Distribution of Studied Sex according to their Dietary Adequacy from Vitamins

Nutrient	Sex					
	Male		Female		Total	
	No	%	No	%	No	%
Vitamin A						
< 50%	155	62.8	165	65.2	320	64.0
≥ 50-75%	34	13.8	35	13.8	69	13.8
≥ 75-100%	10	4.0	14	5.5	24	4.8
≥ 120%	48	19.4	39	15.5	87	17.4
P = NS						
Vitamin C						
< 50%	70	28.3	100	39.5	170	34.0
≥ 50-75%	14	5.7	15	5.9	29	5.8
≥ 75-100%	35	14.2	34	13.4	69	13.8
≥ 100-120%	10	4.0	5	2.0	15	3.0
≥ 120%	118	47.8	99	39.1	217	43.4
P = 0.072						
Vitamin B1						
< 50%	70	28.3	95	37.5	165	33.0
≥ 50-75%	39	15.8	50	19.8	89	17.8
≥ 75-100%	49	19.8	25	9.9	74	14.8
≥ 100-120%	25	10.1	39	15.4	64	12.8
≥ 120%	64	25.9	44	17.4	108	21.6
P = 0.001						
Vitamin B2						
< 50%	60	24.3	85	33.6	145	29.0
≥ 50-75%	0	0.0	25	9.9	25	5.0
≥ 75-100%	40	16.2	29	11.5	69	13.8
≥ 100-120%	30	12.1	20	7.9	50	10.0
≥ 120%	117	47.4	94	37.2	211	42.2
P = 0.000						

Table (5) Mean Number of Food Group Intake per Individual per Week

Studied Group / Food Group	< 3 times/weekly			≥ 3 times/weekly			Total		
	No	%	Mean No of food items per individual	No	%	Mean No of food items per individual	No	%	Mean No of food items per individual
Cereals & Cereals products	3974	22.6	7.95	3212	33.0	6.42	7186	26.3	14.37
Sweets	952	5.4	1.90	1195	12.3	2.39	2147	7.9	4.29
Meat & Meat products	2440	13.9	4.88	609	6.3	1.22	3049	11.2	6.10
Legumes	1544	8.8	3.10	497	5.1	0.99	2041	7.5	4.08
Milk & Milk products	856	4.9	1.71	1136	11.7	2.27	1992	7.3	3.98
Vegetable	2578	14.7	5.16	864	8.9	1.73	3442	12.6	6.88
Fruits	2799	15.9	5.60	779	8.0	1.56	3578	13.1	7.16
Oils	453	2.6	0.91	842	8.6	1.68	1295	4.7	2.59
Nuts	873	5.0	1.75	101	1.0	0.20	974	3.6	1.95
Beverages	1122	6.4	2.24	506	5.0	1.01	1628	6.0	3.26

Table (6) Mean Intake of Different Food Group per Sex

Food intake freq / Food groups	< 3 times/weekly			≥ 3 times/weekly			Total			*P* value
	No	%	Mean intake	No	%	Mean intake	No	%	Mean intake	
Cereals & Cereals products										
Male	1833	46.1	7.41	1581	49.2	6.40	3414	47.5	13.82	0.009
Female	2141	53.9	8.46	1631	50.8	6.45	3772	52.5	14.91	
Sweets										
Male	398	41.8	1.61	654	54.7	2.65	1052	49.0	4.26	0.000
Female	554	58.2	2.1	541	45.3	2.14	1095	51.0	4.33	
Meat & meat products										
Male	1161	47.6	4.70	303	49.8	1.23	1464	48.0	5.93	0.337
Female	1279	52.4	5.06	306	50.2	1.21	1585	52.0	6.27	NS
Legumes										
Male	692	44.8	2.80	233	46.9	0.94	925	45.3	3.75	0.422
Female	852	55.2	3.37	264	53.1	1.04	1116	54.7	4.41	NS
Milk& dairy products										
Male	396	46.3	1.60	586	51.6	2.37	982	49.3	3.98	0.019
Female	460	53.7	1.82	550	48.4	2.17	1010	50.7	3.99	
Vegetables										
Male	1160	45.0	4.70	422	48.8	1.71	1582	46.0	6.41	0.050
Female	1418	55.0	5.61	442	51.2	1.75	1860	54.0	7.35	
Fruits										
Male	1331	47.6	5.39	395	50.7	1.60	1726	48.2	6.99	0.119
Female	1468	52.4	5.80	384	49.3	1.52	1852	51.8	7.32	
Oils										
Male	210	46.4	0.85	378	44.9	1.53	588	45.4	2.38	0.614
Female	243	53.6	0.96	464	55.1	1.83	707	54.6	2.80	NS
Nuts										
Male	421	48.2	1.71	44	43.6	0.20	465	47.7	1.88	0.375
Female	452	51.8	1.79	57	56.4	0.23	509	52.3	2.01	NS
Beverages										
Male	494	44.0	2.00	241	47.6	1.00	735	45.1	3.00	0.177
Female	628	56.0	2.48	265	52.4	1.05	893	54.9	3.53	NS

Table (7): Percent distribution of some socio-economic profile of the studied sample

	No	%
Sex		
Boys	247	49.4
Girls	253	50.6
Age		
≤ 4 Years	178	35.6
4 : ≤ 5 Years	149	29.8
5 : ≤ 6 Years	173	34.6
Birth order		
1	249	49.8
2	171	34.2
3	55	11.0
4	15	3.0
5	10	2.0
Birth order		
$1^{st} - 2^{nd}$	420	84.0
$3^{rd} - 4^{th}$	80	16.0
Family size		
3	54	10.8
4	277	55.4
5	114	22.8
6	35	7.0
7	5	1.0
8	10	2.0
10	5	1.0
Family size		
< 5 Persons	331	66.2
≥ 5 Persons	169	33.8
Relative degree		
No	377	75.4
1^{st} degree	64	12.8
2^{nd} degree	59	11.8
No of rooms		
1	15	3.0
2	233	46.6
3	237	47.4
4	15	3.0
Water		
Yes	465	93.0
No	35	7.0
Socio economic		
Low	44	8.8
Middle	344	68.8
High	112	22.4

Table (8): Percent distribution of positive signs of malnutrition

Signs of Malnutrition	No	%
Hair		
Yes	19	19.0
No	81	81.0
Face		
Yes	7	7.0
No	93	93.0
Eye		
Yes	3	3.0
No	97	97
Lips		
Yes	21	21.0
No	79	79
Tongue		
Yes	5	5.0
No	95	95.0
Teeth		
Yes	20	20.0
No	80	80.0
Gums		
Yes	7	7.0
No	93	93.0
Skin		
Yes	1	1.0
No	99	99.0
Gland		
Yes	2	2.0
No	98	98.0
Nails		
Yes	4	4.0
No	96	96.0
Muscle		
No	100	1.00

Table (9): Frequency distribution of Weight per Age, Height per Age and Weight per Height of the studied group

	No	%
Weight per Age Z score		
Under weight ≤ -2 SD	89	17.8
Normal -2 : 2 SD	387	77.4
Obese ≥ 2 SD	24	4.8
Height per Age Z score		
Stunted ≤ -2 SD	163	32.6
Normal -2 : 2 SD	312	62.4
Tall ≥ 2 SD	25	5.0
Weight per Height Z score		
Wasted ≤ -2 SD	84	16.8
Normal -2 : 2 SD	341	68.2
Obese ≥ 2 SD	75	15.0

4.Discussion

The current study included 500 children; their age distribution was that 35.6% were from 3 to 4 years, 29.8% were above 4 to 5 years and 34.6% in the age group 5 to 6 years. More than half of studied children (50.6%) were female. About (84%) their pregnancy order of 1^{st} to 2^{nd} pregnancy, while (16%) were 3^{rd} to 4^{th} pregnancy. Maternal characteristics such as age, educational level, employment status, sources of knowledge and information about family nutrition may all affect their children nutritional status ***(Nura et al., 1996)(5)***. Educationally, (9%) of the mothers were illiterate while (30.4%) received high education. These results are slightly better than that revealed by***(El-Zanaty et al. 2008)(6)*** in which percent of non educated and

high educated women aged 15-49 of was (32.1% & 11.7%) respectively this difference attributed to that our sample was taken from urban areas so our study subjects are health concerned while EDHS sample taken from urban and rural households. The majority of women were exclusively housewives (76.4%) and only (23.6%) were employed outside the house. In study in Lebanon, a similar observation was noted, where 2.2% of women were working outside the home ***M. Batal et.al., (2010)(7).*** Although the proportion of working women is still low, it is likely to increase in the coming years because of an increase in female literacy, cost of living and opportunities for suitable employment. Pattern of fathers education levels were the same of that of the mothers where (8 %) illiterate while (32.4%) had secondary or diploma level of education. As regard father occupation (28.6%) of studied fathers were professional while (39.8%) were semiprofessional indicate that most of studied families were of middle socioeconomic level (68.8%). The catchment's area of studied group are urban area so it was connected to public water supply and public sewer but some departments especially upper floors had interrupted water supply (7%) so these may obstacle for cleanliness. In the current study almost children were breastfeed (92%) it was the same as a study conducted in Jordan in which (92%) were breastfeed ***(Maha Moh'd Mubaideen, 2006)(8)***and lower than ***El-Zanaty et al. (2008)(6)*** results which was (95.8%). In the Eastern Mediterranean Region, the breastfeeding rate is high compared to countries in other regions, as most populations are Muslims. Muslim mothers follow Koran, which instructs them to breast-feed their children for two years.

The present study revealed that, the bottle-feeding (any food or liquid, including milk and breast milk, given by bottle) was practiced by 30% of studied children. This lower than the results obtained by ***Sheta et al., (2010)(9)*** who showed that bottle feedind rate was (50.2%). Mothers should be encouraged to use a cup and spoon for feeding rather than bottles because of the interference with optimal breast-feeding practices. The nutritional status of the studied children was assessed through anthropometric measurements (Weight-Height, Height- age, Weight-age and BMI - age Z-scores) were generated using the 2006 WHO reference population. Our results showed that (table), prevalence of stunting (Height-age Z score < -2) was 32.6% of studied children, while prevalence of underweight (Weight-age Z score <-2) was only 17.8% this results are much higher than national figures obtained from EDHS 2008 where prevalence of stunting and wasting were 29% & 7% respectively***(El-Zanaty et al., 2008)(6).***These differences between the present study and the EDHS 2008, due to time pass and there is an increase in malnutrition status among preschool children, and the EDHS data were collected from both urban and rural areas and upper and lower governorates of Egypt. As regards obesity (Weight-Height Z score > +2) its prevalence was (15%) of studied children which signals urgent need for Egypt to develop strategies to address this new problem. Overweight could be attributed to inappropriate feeding practices like giving sweetened water based fluids which is too early also depending on carbohydrate rich complementary foods and terminal weaning before 24 months which deprive child from nutritious breast milk. These findings are in agreement with those reported by ***Shaheen et al., (2004)(10)*** who conducted a national survey to assess prevalence of obesity in children under five years of age. The survey covered a sample of nearly 4154 children (2165 males and 1969 females) in eight governorates. It revealed that almost 8% of preschool children were wasted, 3.6% were overweight and 2% were obese.

In the present study, the percent of Height-age Z score < -2 is about one third at different age group ranging from 33.1% - 32.9% with statistically insignificant difference (P=0.108). We found that the percent of Height-age Z score < -2 among males was higher than that among females (35.6% and 29.6 %) respectively, the same occur with Weight-age Z score in which the percent was 19.9% and 15.8% respectively . Similar results were announced by a cohort study conducted in Ethiopia with sample size of 1065, and proved a significantly higher prevalence of under nutrition among boys as compared to girls ***(Girmay Medhin.et.al., 2010)(11).*** The existing vulnerability of boy babies that is seen in all cultures may be partly explained on genetic basis ***(Wells JC, 2000)(12)***. Gender preference and differential feeding practices or neglect of boys are unlikely to be the reason because in Egyptian culture it is the female infants who usually receive less food than their male counterparts. In rural areas of Giza governorate the percentage of underweight and stunting among preschool children was nearly equal to 30.1% and 30% respectively **(El-Shebini *et al.*, 1992)(13).** While in urban area**(El-Masry, 2007)** (14) found that the prevalence of underweight, wasting and stunting among Egyptian school children was 0.0%, 0.7% and 3.7% respectively, the prevalence of those at risk of underweight, wasting and stunting was 8.1%, 13.4% and 18.2% respectively. In Alexandria **(El-Sayed *et al.*, 2001)(15)** found that the prevalence of underweight and stunting was 7.3% and 15% respectively among pre-school children. In Sharkia Governorate, the prevalence rates of underweight, wasting and stunting were 15.4%, 15% and 24.4% respectively **(Shaaban *et al.*, 2005)(16).** In Arabic

countries, different studies assessed the nutritional status of preschool children. In Oman, the prevalence of underweight, wasting and stunting among preschool children were 17.9%, 7.0%, and 10.6% respectively **(Alasfoor *et al.,* 2007)(17).** In Kuwait, wasting was 10% and stunting was slightly lowered being 11.5% in males and 9.9% in females, while 16.1% of boys and 18.4% of girls were obese among preschool children **(Amin and El-Awadi, 1996)(18).** In contrast, **(Al-Issa and Moussa 1998)(19)** reported that the prevalence of obesity among preschool children was 8.2% among Kuwaiti children. In Qatar, 2.4% of the preschool male children were wasted **(Abdulaziz *et al.,* 2004)(20).** In Africa, a survey in Nairobi, Kenya revealed underweight as 26.5%, wasting as 6.2% and stunting as 34.6% **(Kariuki *et al.,* 2002)(21).** While, in rural area of western Kenya the prevalence of underweight, wasting and stunting was 20%, 4% and 30% respectively in the pre-school children **(Kwena *et al.,* 2003)(22).** Regarding Asian countries ,in India ,rates of underweight, wasting and stunting were 31.0%, 9.4% and 23.9% respectively **(Chowdhury *et al.,* 2008)(23).** In China ,lower prevalence of underweight, wasting and stunting were recorded: 22.6%, 7.5% and 23.0% respectively **(Dang *et al.,* 2005)(24).** Regarding Europe, in Italy, the prevalence of overweight was 16.6% and of obesity was 8.0% **(Maffeis *et al.,* 2006)(25).** In UK both under nutrition (3.3%) and obesity (8.5%) significantly exceeded expected frequencies from UK 1990 reference data **(Armstrong et al, 2008)(26).** As regard Latin America, in Brazil, **(Maria and Gisélia 2001)(27)** found underweight in 3.8%, wasting in 1.2% and stunting in 5%. While, nutritional risk for underweight was 24%, 21.6% were at risk for wasting, and 14.3% at nutritional risk for stunting. Overweight was observed in 10.1% and obesity was observed in 4.6%. In Argentina, the prevalence of overweight and obesity were 12.5% and 7.1%, respectively **(Oyhenart et al, 2007)(28).** While, **(Romaguera *et al.,* 2008)(29)** recorded that Stunting was prevalent in 10.7% and 8.2% were obese.

Findings of the present study show that Percent of Height-age Z score <-2 was lower among illiterate (6.1%) than high educated mother (18.4%) with statistically significant difference **(*p*=0.000)**, the same occur with Weight-age Z score where prevalence was (0% & 11.2%) respectively with statistically significant difference **(*p*=0.000).** Against this finding were by ***(El-Zanaty et al., 2008)(6)*** where prevalence of stunting among illiterate mothers and those complete secondary or higher was (30.1% & 28.0%) respectively and prevalence of underweight was (7.6% & 5.3%) respectively. This can be explained by that more educated women looking for anything rather than caring with nutritional status .

In the present study; there is significant difference **(*P*=0.000)** between percent of Height-age Z score < -2 among children of illiterate father (3.1%) and high educated (15.3%) Also percent of Weight-age Z score< -2 was lower among illiterate (0%) than high educated (16.9%) with significant difference **(*P*=0.000).** These findings don't agreement with those reported by ***Girmay Medhin.et.al*. *(2010)(11)*** who showed that prevalence of underweight was higher among children with non literate father than literate (22.7% and 20.3% respectively) with insignificant difference (*P*=0.4). Also prevalence of stunting was higher among non literate father than literate (51.4 and 46.7 respectively) with insignificant difference (*P*=0.1).

Conclusion

There have been marked improvements over the past 10 years in the nutritional status of children in Egypt but much work remains to be done for further decrease levels of childhood malnutrition through further research of determinants of child nutritional status and strategies to solve nutritional problems, Prevalence of underweight is (17.8%) and (4.8%) obese this according to Weight per Age Z score also the prevalence of stunting is (32.6%) while normal is (62.4%) and tall is(5%) this according to Height per Age Z score. And prevalence of wasting is (16.8%) while obesity is (15%) according to Weight per Height Z score. This signals urgent need for Egypt to develop strategies to address this new problem. The present work indicates that child feeding practices are still not to optimum, efforts should be made to change bad behavior and reinforce good ones.

The nutritional status of studied children was significantly lowered with increase family numbers, inappropriate feeding practices, use of baby formula and Socio-economic level.

In the view of the findings of the present study, the following are some recommendations.

Start from infancy:

- Breast-feeding is ideal nutrition and sufficient to support optimal growth and development for about the first 4–6 months after birth. Try to maintain breast-feeding for 12 months. Transition to other sources of nutrients should begin at about 6 months of age to ensure sufficient micronutrients in the diet.
- Don't over feed infants and young children — they can usually self-regulate the amount of calories they need each day. Children shouldn't be forced to finish meals if they aren't hungry as they often vary caloric intake from meal to meal.
- Introduce healthy foods and keep offering them if they're initially refused. Don't introduce foods

without overall nutritional value simply to provide calories.

- Energy (calories) should be adequate to support growth and development and to reach or maintain desirable body weight.
- Eat foods low in saturated fat, trans fat, cholesterol, salt (sodium), and added sugars.
- Keep total fat intake between 30 to 35 percent of calories for children 2 to 3 years of age and between 25 to 35 percent of calories for children and adolescents 4 to 18 years of age, with most fats coming from sources of polyunsaturated and monounsaturated fatty acids, such as fish, nuts and vegetable oils.
- The undergraduate curriculum of medical and paramedical students should contain a detailed knowledge about optimal feeding pattern of children.
- Provide in service training courses of health care providers at PHC centers about issues of breastfeeding and complementary feeding.
- Increase public health awareness about importance of follow up and growth monitoring of growing children in improving child nutrition status.
- Physician and nurses should provide health education to mothers about optimal child feeding practices and its importance in improving child nutritional status.
- Health education of mothers should stress on the benefits of breastfeeding to infants and mothers, and giving child fortified foods and vitamins and mineral supplements.
- Implementation of baby friendly hospital initiative (BFHI) with its ten steps to successful breast feeding in maternity and pediatric hospitals.
- Elimination of illiteracy and improving level of education among mothers and fathers.

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