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Nutritional Assessment of Children in Social Care institutions

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ABSTRACT

Background: Nutritional Problems are prevalent among children living within institution base care (IBC), where they lack parental care which can lead to failure to achieve the target of take care of them perfectly. **Aim of work:** Evaluation the nutritional statue of the children in the social care institutions to detect weaknesses to provide recommendations to develop the food service and the quality of environment generally. Thus, improving their overall health to qualify them as productive youth in society. **Subjects and Methods:** Across-Sectional Analytical study was conducted through face to face interview with the researcher; 192 institutionalized child in Alexandria, Giza, Helwan, 6 October and Tanta social care institutions; 24- Hour Recall questionnaire was used to evaluate the actual daily intake of nutrients and in body device was used with a large percentage of children to assess the anthropometric measurements accurately in addition to the WHO growth chart height, weight and BMI for age. **Results:** The Energy in the food of the studied children and the other macronutrients was almost equal to DRI as the energy was (99.7 %) in girls`, (111 %) in boys`. Protein was (109.5 %) in girls, (139,9) in boys`.Fats was near to DRI as it was in girls about (92 %)and in Boys (109 %). Carbohydrates was (99%), in girls and (106 %) in boys. But fiber and water was less than the DRI especially the wter in boys` food as it was in boys` (79.2 %) but in girls (95.3 %). The fiber was low in both gender. vitamin A was high in boys` food but low in girls` as it was (234%), (51.4%) respectively and the copper was very low in both gender (2) % from DRI. the crystals which was common in boys` urine was calcium (52.4) but uric was (36.9)% in contrast to girls whose the common crystals was uric acid crystals (55)% and the calcium crystal was (25)% , also the boys had indigestive food (starch , fats , muscle fibers , vegetables) (66.7)%, (86.9), (69)%, (54.8) % respectively the ova was in (25)% and larva (4.8) % of boys. **Conclusion:** The children in these institutions had an adequate food in amount but it lack from fiber and some minerals and vitamins as copper, magnesium and vitamin A specially in girls. they also need to qualify the sorts of food to meet their need from all nutrients.

Keywords: mean intake, DRI, weight for age, height for age, BMI.

1. Introduction

The healthy eating and proper nutrient intakes in childhood are a necessary for optimal growth, development, and disease prevention. Poor dietary habits established during childhood may increase susceptibility for delayed mental and motor development that may have life-long enduring effects (Marçal *et al*., 2021). An imbalance in nutritional intake leads to malnutrition. The word 'malnutrition' is defined in several ways, and there is still no consensus. The presentation of malnutrition can be acute, sub-acute, or chronic and may or may not be associated with underlying inflammation. Furthermore, the double burden of malnutrition has also been confirmed in various studies. This involves the dual aspect of over nutrition and undernutrition, which makes the diagnosis of malnutrition a challenge (Kesari and Noel, 2023).

Hence, a comprehensive, multi-faceted assessment of a child's nutritional status is justified. A comprehensive nutritional assessment, however, should be differentiated from nutritional screening. Nutritional screening is done to quickly identify individuals at risk of developing malnutrition (Reber

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et al., 2019). UNICEF estimates that there are some 140 million orphans worldwide who have lost either one or both of their parents. Although most orphans live with other family members, some live in institutionalized care or residential care facilities (Petrowski *et al.*, 2017). Institutionalized care is defined by the United Nations as residential care that is provided in any non-family-based group setting, including all other short- and long-term residential care facilities (DeLacey *et al*., 2020). Millions of non-orphaned children are separated from their biological parents either permanently or semi-permanently and are in need of supportive living environments. This separation often occurs because biological parents are: (a) unable to provide food, shelter, and safety; (b) forced to leave their children to seek employment elsewhere; or (c) physically or mentally unable to care for their children (Huynh *et al.*, 2019). These children are also vulnerable. Approximately 2.7 million children ages 17 years and younger live in residential care globally: 120 children per 100,000. There is no updated data on the number of children and young adults in the social care institutions in Egypt. Still, according to Abdel-Aziz, there are ten thousand children in social care institutions placed in about 500 care homes (Kamel *et al*., 2019).

The main objective of this study was to assess the nutritional status of children in social care institutions in Egypt in order to assess healthcare providers in developing appropriate program aimed to improve life style as well as food and health habits of those children.

2. Subjects and Methods

2.1. Study setting and design

Across-sectional Study carried out among children in social care Institutions. Target populations were from (Alex, Giza, Helwan and Haram city) who aged (5-14) years and showed willingness to participate in the study.

2.2. Duration of the study and data collection

The data collection was initiated in October 2020 and completed in April 2021. The child was interviewed by the researcher individually in their institutions and each interview took about 30-40 minutes.

2.3. Sampling size and Tools of the study

This study conducted on **(**192 institutionalized child). Online Sample size calculator software (Arifin, 2023) was used for sample size calculation. Study tools included an interview questionnaire distributed and given to the children to collect information from them about: Personal data (name, gender, age); Socio-demographic data which includes information about Socio-economic status demographic data including; date of birth, education status, (Park and Park, 1979).

2.2. Nutritional Status assessment (ABCD)

2.2.1. Anthropometric measurement

Measure the weight and height of child. In pediatric age groups, these parameters are plotted on growth charts to assess growth and nutritional status. BMI (weight in kilograms divided by height in meters squared) is also calculated using these parameters, and the state of nutrition can be assessed (Nuttall, 2015). So, we used to assess body composition bioelectrical impedance analysis (BIA) to determine the percentage of the components of the body(Casadei and Kiel, 2023). The formulas for the calculation of BMI in children: BMI = weight in kilograms/ [height in meters x height in meters].Growth Charts for children with disorders that alter the growth pattern need specialized plots to obtain meaningful results (Kesari and Noel, 2023).

2.3. Biochemical measurements: Complete blood count (CBC) - Stool and urine examination.

2.4. Clinical Assessment (some physical signs): Examination of signs of apparent diseases such as skin diseases, dental caries and malnutrition.

2.5. Dietary Intake Assessment

The 24-hour recall is used to describe the average dietary intake of groups of individuals. Participants are asked to recall and describe in an open-ended manner the foods and beverages

consumed over one day, preferably the day before, in detail and depth (Bailey, 2021). Food Frequency Questionnaire (FFQ) was to every institution as total because it offers the same food for its children. A qualitative FFQ refers to a questionnaire that does not collect additional information about portion size;, intake over weeks, months, or years, is conceptually relevant exposure rather than intake over a few specific days (Naska *et al.*, 2017). It is important to consider the number of items that was be included and the method for measuring portion sizes if the FFQ is quantitative (Mututanthri *et al*., 2023).

2.5. Statistically analysis

Data were analyzed using SPSS version 25 (SPSS, 2017). Quantitative data were presented as Mean ± SD, median and interquartile range and qualitative data were presented as frequencies and percentages. The chi-square and Monte Carlo exact tests were used to assess associations between qualitative variables. According to type of quantitative data, the Mann-Whitney U test was carried out to compare non-parametric data among the different groups. The level of significance was considered at p value <0.05.

5. Results

The current study was conducted on 192 children living in social care institutions in Alex, Cairo, Giza, 6 October, Wadi hoof and Tanta. The necessary statistical tests were conducted to compare between groups and the results showed the following:

Table (1) Shows number and the ratio between girls and boys in the study was one-third to two-third**.**

Table 1: Demographic characteristics of studied children (n=192)

Characteristics	**Total children (n=192)**	
	N	**%**
Sex:		
Female	64	33.3
Male	128	66.7
Age:		
Range	5-14	
Mean ± SD	10.5±1.9	
Median (IQR)	11(9-12)	

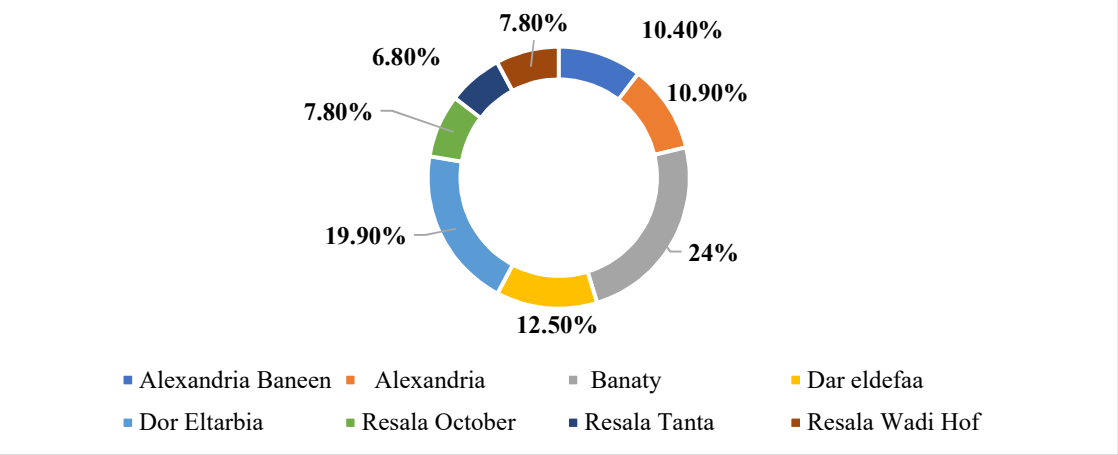

Fig. 1: Distribution of studied children in different institutions (n=192)

Table (2) shows a significant difference in weight between boys and girls in the weight for age according to the WHO growth chart standards which was the severe underweight in only (1.6 %) in both genders, the underweight was only (10.9 %) in boys and (7.3 %) for total. The normal weight for

age was the major percentage (50 % 49.2%, 49,7 %) for boys; Girls and total respectively. While obesity was (20.3 %;19 %;19.9 %) for boys; girls and as total respectively. while the obese cases (17.2 %; 29.6 % 21.3 %) in boys, girls and total respectively. There was no significant difference in height or BMI for age between boys and girls.

Table 2: Classification of weigh, height and BMI for age of studied children according to the World Health Organization (WHO)`s growth chart standard (n=192)

Parameters		Total children (n=192)						Test of significance	P value
		Male (n=128)		Female (n=64)		Total (n=192)			
		n	%	n	%	n	%		
Weight for age	Severe underweight	2	1.6	1	1.6	3	1.6	MCET	**0.017***
	Underweight	14	10.9	0	0.0	14	7.3		
	Normal	64	50.0	31	49.2	95	49.7		
	At risk of obesity	26	20.3	12	19.0	38	19.9		
	Overweight	17	13.3	18	28.6	35	18.3		
	Obese	5	3.9	1	1.6	6	3.1		
Height for age	Severe stunted	7	5.5	2	3.1	9	4.7	MCET	0.158
	Stunted	12	9.4	4	6.3	16	8.3		
	Normal	78	60.9	36	56.3	114	59.4		
	At risk of short stature	25	19.5	13	20.3	38	19.8		
	Tall	5	3.9	9	14.1	14	7.3		
	Very tall	1	0.8	0	0.0	1	0.5		
BMI for age	Severe underweight	6	4.7	1	1.6	7	3.6	MCET	0.410
	Underweight	16	12.5	6	9.4	22	11.5		
	Normal	58	45.3	38	59.4	96	50.0		
	At risk of obesity	32	25.0	14	21.9	46	24.0		
	Overweight	13	10.2	5	7.8	18	9.4		
	Obese	3	2.3	0	0.0	3	1.6		

MCET=Monte Carlo Exact Test

Table (3) shows a significant difference in lean body mass and total body water between boys and girls as the mean was (35.3 kg, 30.5 Kg) and (25.7 kg, 21.9 Kg) in boys and girls respectively.

Table 3: In-body parameters of studied children (n=192).

Gender			In body parameters					
			Weight (kg)	L.B.M (kg)	T.B.W (kg)	Body fat	Ratio of E. C.W to T.B..W	B.M.R
Male	Mean		39.427	35.331	25.721	6.859	0.37188	1218.19
	Std. Deviation		14.6813	9.1132	6.6530	3.7741	0.010618	168.780
	Minimum		18.0	14.0	10.5	0.7	0.347	872
	Maximum		122.0	53.0	38.0	16.9	0.410	1551
	Percentiles	25	30.075	29.450	21.125	4.000	0.36650	1092.25
		50	36.000	34.650	25.450	6.550	0.37200	1200.00
		75	44.475	40.950	29.525	9.000	0.37750	1340.00
Female	Mean		37.316	30.549	21.961	8.020	0.37629	1155.27
	Std. Deviation		13.1453	8.2891	5.9233	5.1054	0.017610	90.231
	Minimum		18.0	14.7	10.5	2.7	0.342	993
	Maximum		72.0	47.0	33.5	23.0	0.450	1327
	Percentiles	25	26.925	23.250	16.700	4.100	0.36700	1077.50
		50	33.950	29.200	21.000	6.100	0.37100	1152.00
		75	47.150	37.150	26.750	11.500	0.38300	1229.50
Mann-Whitney U			3665.000	837.500	811.500	1107.500	1077.000	923.000
P value			0.235	0.013*	0.007*	0.563	0.426	0.059

*Denotes significant
L.B.M= Lean Body Mass T.B.W = Total Body Water E. C.W ratio to T.B.W = Extracellular water to total body water
B.M.R = Basal Metabolic rate.

Table (4) shows significant difference between males and females (Alexandria Banat) in the study in the amount of Pus and sorts of crystals in urine, also the absent or present of starch, fats, muscle fibers, vegetables, ova in the stool analysis. As the pus cells was (10+) in (3.5%) boy's urine and the crystals which was common in boy's urine was calcium (52.4%) but uric was (36.9%). On contrast, the common crystals in girls was (55%) uric acid crystals however (25%) from calcium crystal, also the boys had indigestive food (starch, fats, muscle fibers, vegetables) by (66.7%, 86.9%, 69%, 54.8 %) respectively. The ova were in (25%) and larva's in (4.8 %) of boys.

Table 4: Urine and stool assessment of studied children (n=104)

Parameters		Total children (n=1104)						Test of significance	P value
		Male (n=84)		Female (n=20)		Total (n=104)			
		n	%	n	%	n	%		
Mucus	Absent	78	92.9	20	100	98	94.2	MCET	0.351
	Present	6	7.1	0	0.0	6	5.8		
Pus	0-1	52	61.9	0	0.0	52	50.0	MCET	**0.000***
	2_4	18	21.4	20	100	38	36.5		
	5_10	11	13.0	0	0.0	11	10.6		
	10+	3	3.5	0	0.0	3	2.9		
Red Blood cells (RBCs)	0_1	84	100	20	100	104	100	NA	
Crystals	Absent	18	21.4	4	20.0	18	17.3	MCET	**0.000***
	Ca crystals	44	52.4	5	25.0	49	47.1		
	Uric acid	31	36.9	11	55.0	42	40.4		
Starch	Absent	28	33.3	20	100	48	46.2	χ^2=28.889	**0.000***
	Present	56	66.7	0	0.0	56	53.9		
Fats	Absent	11	13.1	20	100	31	29.8	χ^2=58.310	**0.000***
	Present	73	86.9	0	0.0	73	70.2		
Muscle Fibers	Absent	26	31.0	20	100	46	44.2	χ^2=31.222	**0.000***
	Present	58	69.0	0	0.0	58	55.8		
Vegetables	Absent	38	45.2	20	100	58	55.8	χ^2=19.639	**0.000***
	Present	46	54.8	0	0.0	46	44.2		
Ova	Absent	63	75.0	20	100	83	79.8	χ^2=6.265	**0.012***
	Present	21	25.0	0	0.0	21	20.2		
Larva	Absent	80	95.2	20	100	100	96.2	MCET	0.586
	Present	4	4.8	0	0.0	4	3.8		

χ^2=chi square test *Denotes significant MCET=Monte Carlo Exact Test

Table (5) shows a significant difference between boys and girls in the intake of (Energy, Protein, Fats and carbohydrate) as a percentage from DRI. The Energy was almost equal to DRI mostly in girls as it was (99.7 %), while was (111 %) in boys and (107 %) for total. Protein was more a bit than DRI that it was (109.5 %) in girls, (139,9%) in boys and (129.4 %) for total. While Fats was near to DRI as (92 %, 109 %,103 %) for girls, boys and total respectively. While Carbohydrates was about (99%,106 %,104%) from DRI for girls, boys, total respectively.

Table (6) shows significant difference in the mean intake of micronutrients (minerals) as a percentage from DRI among studied children. As we can see that was the boy's intake was greater than girls from all minerals. About Sodium (1476.2%, 1754.5%,1653.8 %) for girls, boys and total respectively as percent from DRI. Potassium was (205.1% ,170.3% ,193.1%) for boys, girls` and total respectively. For phosphorous it was (234.2 %,266.8%,255.6 %) girls, boys and total respectively. For calcium, it was (87.2%,119%,108.2%) girls, boys and total) respectively. It was a remarkable decrease in Magnesium in the mean Intake as a percentage from DRI in both genders. Especially in girls (57.4%), (85.6%) for boys and (75.9%) in total. While Iron intake was higher than DRI (156.6%) in girls, (180.5%) in boys and (172.2%). For Zinc it was more than double of DRI in both genders as it was (219.8% ,273.8 %, 255.1%) in girls, boys and total respectively. However, for Copper was very little from DRI only (0.2%) in both genders 'food.

Table 5: Mean energy and macronutrients intake as Percent from DRI among studied children (n=192)

Variables			Total children (n=192)			Test of significance	P value
			Female (n=64)	Male (n=128)	Total (n=192)		
Energy %	Mean		99.7	111.3	107.3	Z=-3.157	**0.002***
	Std. Deviation		30.4	29.7	30.4		
	Minimum		54.8	22.3	22.3		
	Maximum		202.6	236.6	236.6		
	Percentiles	25	79.2	95.9	87.2		
		50	98.1	107.9	103.7		
		75	111.8	123.5	121.6		
Protein %	Mean		109.5	139.9	129.4	Z=-4.440	**0.000***
	Std. Deviation		42.9	46.9	47.7		
	Minimum		40.4	19.6	19.6		
	Maximum		256.8	263.8	263.8		
	Percentiles	25	79.8	99.3	91.1		
		50	103.2	139.3	120.6		
		75	132.9	174.8	162.6		
Fat %	Mean		91.8	109.3	103.3	Z=-4.250	**0.000***
	Std. Deviation		33.1	33.0	34.0		
	Minimum		42.0	11.7	11.7		
	Maximum		186.3	289.2	289.2		
	Percentiles	25	68.8	91.3	84.8		
		50	87.8	103.9	99.5		
		75	106.1	118.8	115.7		
Carbohydrates %	Mean		98.9	106.5	103.9	Z=-2.439	**0.015***
	Std. Deviation		34.8	31.7	32.9		
	Minimum		53.2	26.3	26.3		
	Maximum		229.5	233.5	233.5		
	Percentiles	25	75.3	89.7	83.6021		
		50	89.9	103.1	99.2		
		75	114.4	120.7	116.9		

Z=z score of Mann Whitney U test * =statistically significant

Table 6: Mean micronutrients intake as Percent from DRI among studied children (n=192)

Variables			Total children (n=191)			Test of significance	P value
			Female (n=64)	Male (n=128)	Total (n=192)		
Sodium (gm)%	Mean		1476.2	1754.5	1658.3	Z=-4.599	**0.000***
	Std. Deviation		340.8	429.6	421.7		
	Minimum		710.7	234.4	234.4		
	Maximum		2761.7	2858.6	2858.6		
	Percentiles	25	1286.9	1489.6	1393.3		
		50	1484.9	1757.6	1613.8		
		75	1661.3	1997.7	1903.5		
Potassium (gm) %	Mean		170.3	205.1	193.1	Z=-3.632	**0.000***
	Std. Deviation		56.8	65.3	64.5		
	Minimum		79.6	25.5	25.5		
	Maximum		308.1	425.5	425.5		
	Percentiles	25	127.5	155.7	148.5		
		50	163.6	192.8	181.7		
		75	207.2	248.5	242.0		
Calcium (gm)%	Mean		87.2	119.2	108.2	Z=-7.094	**0.000***
	Std. Deviation		28.2	28.6	32.2		
	Minimum		32.2	7.4	7.4		
	Maximum		199.1	187.0	199.1		
	Percentiles	25	67.6	102.1	86.6		
		50	82.6	117.1	104.8		
		75	101.7	142.1	132.0		
Phosphorus (gm)%	Mean		234.2	266.8	255.6	Z=-2.905	**0.004***
	Std. Deviation		65.1	72.6	71.7		
	Minimum		79.5	42.0	42.0		
	Maximum		414.7	590.2	590.2		
	Percentiles	25	192.4	219.3	208.5		
		50	238.9	254.5	251.3		
		75	276.6	310.6	295.5		
Magnesium (mg)%	Mean		57.4	85.6	75.9	Z=-6.046	**0.000***
	Std. Deviation		28.9	32.5	33.9		
	Minimum		16.8	10.8	10.8		
	Maximum		160.1	224.4	224.4		
	Percentiles	25	36.6	62.2	50.5		
		50	48.4	80.8	74.6		
		75	75.5	96.9	91.8		
Iron (mg)%	Mean		156.6	180.5	172.2	Z=-2.856	**0.004***
	Std. Deviation		39.9	56.5	52.5		
	Minimum		76.8	33.8	33.8		
	Maximum		250.0	362.9	362.9		
	Percentiles	25	133.3	140.9	138.2		
		50	158.1	175.4	167.2		
		75	182.3	210.0	198.5		
Zinc (mg)%	Mean		219.8	273.8	255.1	Z=-5.048	**0.000***
	Std. Deviation		57.6	73.3	72.8		
	Minimum		77.2	52.4	52.4		
	Maximum		367.2	532.6	532.6		
	Percentiles	25	175.8	225.5	212.8		
		50	220.5	272.2	255.2		
		75	257.9	313.6	299.0		
Copper (mg)%	Mean		0.2	0.2	0.2	Z=-.456	0.648
	Std. Deviation		0.1	0.1	0.1		
	Minimum		0.1	0.1	0.1		
	Maximum		0.4	0.6	0.6		
	Percentiles	25	0.2	0.2	0.2		
		50	0.2	0.2	0.2		
		75	0.3	0.30	0.3		

Z=z score of Mann Whitney U test * =statistically significant

Table (7) shows a significant difference in the intake of vitamin A, C and Riboflavin as a percentage from dietary reference intake (DRI), as the boys, girls and total had (234%, 51.4%,170.9%) respectively. vitamin C in foods was (145.2%,99.7%, 129.4%) in boys, girls and total respectively. Riboflavin was (191.3%, 437.4%, 276.3%) in the boys, girls and in total respectively.

Table 7: Mean vitamins intake among studied children as a percentage from the DRI (Dietary Reference Intake) (n=192).

Variables			Total children (n=192)			Test of significance	P value
			Female (n=64)	Male (n=128)	Total (n=192)		
Vitamin - A (mg)%	Mean		51.4	234.0	170.9	Z=-7.044	**0.000***
	Std. Deviation		20.5	405.2	338.9		
	Minimum		8.4	9.6	8.4		
	Maximum		123.3	2202.2	2202.2		
	Percentiles	25	37.2	60.4	50.0		
		50	48.9	70.3	62.0		
		75	61.4	96.6	80.7		
Vitamin - C (ug RE) %	Mean		99.7	145.2	129.4	Z=-4.576	**0.000***
	Std. Deviation		52.8	74.5	71.1		
	Minimum		12.0	0.0	0.0		
	Maximum		268.4	355.2	355.2		
	Percentiles	25	69.4	96.7	79.6		
		50	90.0	142.4	129.2		
		75	135.6	179.9	169.4		
Thiamin (mg)%	Mean		183.1	176.3	178.6	Z=-1.158	0.247
	Std. Deviation		59.9	55.6	57.1		
	Minimum		43.3	36.7	36.7		
	Maximum		330.0	365.0	365.0		
	Percentiles	25	153.3	140.9	143.3		
		50	182.5	173.3	176.7		
		75	220.4	210.0	213.3		
Riboflavin (mg)%	Mean		437.4	191.3	276.3	Z=-3.957	**0.000***
	Std. Deviation		2406.6	90.2	1414.4		
	Minimum		58.3	30.0	30.0		
	Maximum		19690.0	568.3	19690.0		
	Percentiles	25	110.0	127.5	118.3		
		50	138.3	171.7	156.7		
		75	163.7	214.2	196.7		

Z=z score of Mann Whitney U test * =statistically significant

Table (8) shows a significant difference in the intake of water and fiber. The female had more than boys from water (1800.4 ml) while the boys had only (1473.6 ml) and as total in the water was (1581.9 ml). while girls had lower intake than boys in fiber (8 gm) in girls and (9.1 gm) in boys. and a significant difference in the intake of Water and Fiber as a percentage from DRI, the female had most of their dietary reference intake from water (95.3%) while the boys had (79.2 %) and as total the water was (84.6 %). However, the fiber was low in both gender as it was (32%) from DRI in girls and (36.4%) in boys.

Table 8: Mean intake of water and fibers among studied children and as a percentage from DRI among studied children (n=192)

Variables			Total children (n=192) Female (n=64)	Male (n=128)	Total (n=192)	Test of significance	P value
Water (ml)	Mean		1800.4	1473.6	1581.9	Z=-5.564	**0.000***
	Std. Deviation		352.8	337.9	375.2		
	Minimum		1065.1	595.4	595.4		
	Maximum		2530.6	2469.0	2530.6		
	Percentiles	25	1528.8	1223.3	1299.7		
		50	1771.1	1447.3	1555.3		
		75	2071.1	1723.2	1829.4		
Fiber (gm)	Mean		8.0	9.1	8.7	Z=-2.364	**0.018***
	Std. Deviation		2.2	3.1	2.9		
	Minimum		3.5	1.3	1.3		
	Maximum		12.2	20.8	20.9		
	Percentiles	25	6.3	7.1	6.7		
		50	7.9	8.7	8.4		
		75	9.7	11.1	10.5		
Water (gm) %	Mean		95.3	79.2	84.6	Z=-5.054	**0.000***
	Std. Deviation		18.7	21.3	21.8		
	Minimum		41.9	27.1	27.1		
	Maximum		137.2	141.3	141.3		
	Percentiles	25	84.8	63.6	66.8		
		50	93.9	76.5	85.2		
		75	106.6	94.2	100.6		
Fiber (gm)%	Mean		32.0	36.4	34.9	Z=-2.345	**0.019***
	Std. Deviation		8.9	12.4	11.5		
	Minimum		14.0	5.4	5.4		
	Maximum		48.9	83.6	83.6		
	Percentiles	25	25.3	28.4	26.7		
		50	31.7	34.8	33.7		
		75	39.1	44.2	42.1		

Z=z score of Mann Whitney U test * =statistically significant

4. Discussion

Malnutrition continues to affect many countries worldwide with millions of children having inadequate access to nutritious food. Almost half of the deaths among children younger than 5 years old have undernutrition as an underlying factor. Malnutrition also predisposes children to long-term impairments such as diminished cognition, disability, non-communicable diseases and suboptimal performance at school and work (Farha and Said, 2021). Thus, this study was conducted to assess the nutritional status of children in social care institutions in Egypt.

Regarding demographic characteristics of studied institutionalized children the current study shows that age of the studied participants was range from (5-14) years old as well as (66.6%) of the studied participants were males respectively, this result is in the same line with (Ramos-Goñi *et al.,* 2022) who found that the range of the studied child were about 5-15 years old. while this result is in contradiction with (Labots *et al.,* 2018) who found that 57% of trial participants were female.

Concerning classification of weight of studied children for age according to WHO, the current study shows that the majority of studied children was in normal weight and a little percentage was obese but not a small percentage was overweight especially in females and both gender at risk of obesity with apparent percentage, a small percentage and a very little percentage suffered from severe underweight table 2. This result is matched with (Jackson & Cunningham, 2017) who found that the study children were in normal weight and have BMI z-scores were highly stable throughout childhood

Lean Body Mass) of studied children, the current study mentions that the lean body mass was larger in the bodies of males than females. This result may be due to Maternal BMI in girls (Table 3); this result is in agreement with (Bredella, 2017) who mentioned that Body composition differs between

men and women. Men have more lean mass, and women have more fat mass than men. The fats are lighter than muscles.

In relation to the Total Body water of the studied children, the current study estimates that TBW was larger in males` bodies (25.7) % than girls (21.9) %.

this result is matched with (Mattoo *et al.,* 2020) who found that a scatterplot of TBW between genders of normal weight in which Females had a slightly higher R-squared value (94.4%) compared to males (92.9%); This is also due to the high percentage of muscles in males` bodies that contain a higher percentage of water compared to fat tissue which is higher in females` bodies. As testosterone is heavily studied for its pro-hypertrophic/anabolic effects on skeletal muscle. (Haizlip *et al*., 2015).

Concerning urine and stool assessment of studied children, the current study mentions that there is shows significant difference between males and females regarding the amount of Pus in urine, and sorts of crystals in urine, also the absent or present of Starch, Fats, Muscle Fibers, Vegetables, and Ova in the stool analysis. (Table 4) In this context, (Suh *et al.,* 2021) found that (13.5%) of the study children showed pyuria in centrifuged urine sample of which 11 (40.7%) were males and 16(59.3%) were females (13.5%) showed significant pus cells in urine.

In relation to crystals in urine of studied children, the current study shows that the more common crystals in males' urine analysis was calcium crystals while the more common in females` urine was uric acid crystals as in (3.5%) boy's urine and the crystals which was common in boy's urine was calcium (52.4%) but urice was (36.9%). On contrast, the common crystals in girls was (55%) uric acid crystals however (25%) from calcium crystal, also the boys had indigestive food (starch, fats, muscle fibers, vegetables) by (66.7%, 86.9%, 69%, 54.8 %) respectively. The ova were in (25%) and larva's in (4.8 %) of boys. This result is mis matched with (Zhang *et al.,* 2021) who found that the most common type among male participants was calcium oxalate as well as were the most common crystals in females.

Regarding ova in stool of studied children, the current study displays those ova of parasites was presented in stool of males not females as it was (25) % in boys` stool. This result is in agreement with (Alharazi *et al.,* 2020) who revealed that intestinal parasites were slightly higher among males (28.6%) than females (27.2%).

Concerning mean energy and macronutrients intake as a percentage from DRI among studied children, the current study shows a significant difference between boys and girls in the intake of (Energy, Protein, Fats and carbohydrate) as a percentage from DRI. The Energy was almost equal to DRI mostly in girls as it was (99.7 %), (111 %) in boys and 107 % as general. Protein was more a bit than DRI that it was (109.5 %) in girls, (139,9%), (129.4 %) respectively at both as in (92 %, 109 %,103 %) for girls, boys and total respectively. While Carbohydrates was about (99%, 106 %, 104%) from DRI for girls, boys, total respectively. In this context (Huynh *et al*., 2008) who found that the dietary intake of the participants contained more energy from protein and fat, particularly animal protein and fat, and less energy from carbohydrates, than the RDA.

Regarding mean micronutrients intake as a percentage from DRI among studied children, the current study shows significant difference in actual intake of micronutrients (vitamins and minerals) as a percentage from DRI among studied children that was the boys intake was greater than girls from all minerals Table 6 as well as a significant differences in the intake of vitamin A, C and Riboflavin as a percentage from DRI , The female had only half of of their dietary recommended intake (DRI) from vitamin A (51.4)%) while the boys had more than double of their DRI (234 %), and as total was more than DRI (170.9%).Vitamin C was more DRI by half in boys (145.2 %) while it was near to the DRI in girls (99.7%). And more than DRI (129.4%) in total. Riboflavin was more than quadruple from DRI in girls (437.4%) while in the boys was near double of DRI (191.3%) and more than double in total (276.3 %) Table 7.

In this context (Kutbi, 2021) mentioned that over two-thirds of the children had over half had adequate intakes (AIs) of vitamin C and phosphorus. On the other hand, data indicated that low proportions of children consumed adequate usual intakes of magnesium, Over half of the children in his sample met the AIs for sodium and vitamin D. Only small proportions of children met the AIs for calcium, potassium and fiber.

About The mean intake of water and fibers as a percentage from DRI among studied children, The female had most of their dietary recommended intake from water (95.3%) while the boys had (79.2 %) and as total the water was (84.6 %). However, the fiber was low in both gender as it was (32%) from DRI in girls and (36.4%) in boys.

This result is in contradiction with (Drozdowska *et al.*, 2020) who stated that the results of cross-sectional surveys from 13 countries (The Liq.In7 Initiative) revealed that (61%) of children and (75%) of adolescents did not consume enough water from fluids , regarding the recommendations for daily water intake (1.700 mL/day for boys 9 to 13 years old and 1.520 mL/day for girls 9 to 13 years old) provided by the EFSA (European Food Safety Authority) (EFSA Panel on Dietetic Products 2010) These observations are consistent with further studies that showed that children drink insufficient amounts of water.

Recommendation

- The necessity of hiring a dietitian for the children in every institution.
- Provide food in amount appropriate to the age, height, weight and the activity to every child.
- Paying attention to the quality and the quantity of foods which provided to the child.

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