A COMPARATIVE STUDY FOR THE EFFECTS OF MALNUTRITION AMONG A GROUP OF INFANTS AND PRESCHOOL CHILDREN VERSUS A CONTROL GROUP IN MINUFIYA GOVERNORATE

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Abstract

Many researchers report that heights and weights of Egyptian infants are comparable to those in developed countries; however, these measures lags behind during the course of development of the child. Based on that, this study was conducted to investigate a group of infants and preschool children who suffer malnutrition to : 1) detect diseases of malnutrition and their prevalence. 2) compare the anthropometric measurements of this group "malnourished" with those of a control group. In addition comparing both results to the standards. 3) tallying health problems in the malnourished group. 4) studying socioeconomic status of both groups for it may shed some light on the probable causes of malnutrition and its consequences. A diagnosed malnourished sample of 69 infants and 141 preschool children who were visiting hospitals for medical treatment were chosen. Another 160 children matched group not complaining of any diseases was taken as " a control". Children in the latter group were picked up from kindergartens and from mother and child health centers. All samples were from the same towns; Shebin El-Kom, Shuhada, Al-Bagour, and Tala in Minufiya Governorate.

The results obtained revealed that in the malnourished group, marasmus is 19% common among males and 18.1% among female children; Kwashiorkor is 10% among males and 12.9% among females, anemia is 21.9% prevalent among males and 15.2% among females, rickets 1% among females, marasmus and rickets together were 1% in males only. Calcium deficiency associated with previous malnutrition illness, is 5% among males and 11% among females.

Comparing the anthropometric measurements of the malnourished group with the control group, of the sameage, it is evident that : there are significant differences in weight, height, arm circumference, triceps skinfold thickness, muscle circumference, chest circumference, arm circ./ height and arm circ./head circ. ($P < 0.001$). Differences in Body Masslndex, arm circ./head circ. is significant between them ($P < 0.01$). Head circ. of the control preschoolers significantly better than of the malnourished preschoolers ($P < 0.01$). All these measurements favored the control groups.

Results also showed that food allergy, bad appetite, difficulty in swallowing, parasites, gastrointestinal problems, mouth problems and chronic diseases were more prevalent in the malnourished group. The control group consumed more amounts of food than the malnourished. It is evident from the results that as father's education increases mother'seducation increases, total income of the family increases, number of children in the family decreases. Consequently crowdedness decreases, disorders decreases among family members, their consumption of medicines decrease, the child's appetite increase, his/her food consumption increases and subsequently his/her anthropometric measurements increase. Several recommendations were introduced to treat malnutrition problems among children.

INTRODUCTION

Malnutrition is one of the major problems that face human development in most developing countries. Nearly all studies showed a high prevalence of malnutrition in poor developing countries.

The consequences of malnutrition become very serious when it start in infancy or during childhood. Any late intervention after that is worthless. High mortality rate, infectious diseases, malnutritional disorders as well as retarded growth, declining level of intellectual abilities, and problems of learning and behavior, low productivity, and health status are all associated with malnutrition in the early stages of child growth.

It has been reported that where environmental conditions are poor, small children may suffer from infection for almost half of their first three years of life, (Fimalif et al., 1991).

Infectious diseases are important conditioning factors responsible for malnutrition, particularly in small children.

In Egypt, the problem of malnutrition is a complex one as it is the result of the interaction of dietary practices, infections, and family health history.

It was observed that weights and height of Egyptian infants were similar to that of infants in developed countries during the first months of life, later they deviate below denoting that growth retardation begins during late infancy and early childhood (Olson, 1989).

Several studies showed prevalence of malnutrition during the last three decades. Shukry et al., (1972) stated that 50 - 80% of children below 5 years of age had mild PEM while the severe forms represented 1.3 - 15.4%. Hussein et al., (1989) found that the prevalence of acute under-nutrition among preschool children in Egypt was 7.1% while that of chronic under-nutrition was 23.4% with overall prevalence of 47.4%.

Malnutrition was found to be more common in rural than in ubran areas and more in upper than in lower Egypt. Gabr et al., (1990) reported the prevalence of PEM in Egypt to be 38.7%.

Infants who are breast-fed have fewer respiratory diseases, than do infants fed by bottle (Alisonchrak et al., 1985). Mothers' milk contains certain antibodies which increase resistance to certain infections.

The level of parent;s education, family income and family size are among the factors that contribute to the quality of the child diet that is reflected on the child nutrition and growth (Cornu et al., 1995; Hussein, 1995).

A study project covered four Egyptian governorates (7.000 families) from rural and urban areas indicated that one-third of the children sample were low height for age, which reflects the accumulative effect of malnutrition and 11% of children showed lower weight than normal, Anon (1995).

Haller and Cotton (1983) reported that protein-energy malnutrition (PEM) has always been associated with infant and children, especially, in developing countries. PEM is a complex nutritional problem that requires particular attention to the quality and quantity of diet during rehabilitation. A deficit in protein and/ or energy is compounded by a low intake and/or malabsorption of minerasl and vitamins.

Scattered surveys of preschool children revealed that anemia is a major nutritional problem among this age group. One of the latest figures is 45%, (Mousa, 1988).

The most recent study on the prevalence of anemia conducted by the Nutrition Institute (1995) showed that anemia among preschool children was 25.2% which is much less than the prevalence of anemia in 1978.

Aim of the work :

Investigate a group of diagnosed malnourished preschool and breast-fed children in order to detect the prevalence of malnutritional diseases in comparison with another control group. Compare the malnourished groups with their relevant controls and the standards on the anthropometric measures. Tallying other health problems in all groups; malnourished and controls. Study the socioeconomic status of both groups to shed some light on the probable causes of malnutrition and its consequences.

Materials and Methods :

210 preschool children who were suffering malnutrition, according to physicians' reports, and were visiting the out-patient clinics and some health centers were examined. This "malnourished" group consisted of 141 preschoolers and 69 breast fed children were taken from hospitals and clinics in Shibin El-Kom, Al-Shohada, Al-bagour, and Tala.

In addition, 160 healthy "Control" group that is consisted of 100 preschool, and 60 breast-fed children, the individuals of this group were taken from kindergartens and maternal and child health centers in the same mentioned areas where they were receiving vaccination, table (1).

Table (1) : Study samples according to sex, group identity, numbers, and age in months.

Sex	n	Malnourished groups		Control groups	
		Preschoolers n = 141 age (mo.)	breast-fed n = 69 age (mo.)	Preschoolers n = 100 age (mo.)	breast-fed n = 60
Males	219	28.5	10.13	28.5	10.1
Females	151	28.39	10.21	28.4	10.08

Data collection included : identifying the malnutritional diseases diagnosed at the hospitals and the clinics by physicians. Taking the anthropometric measurements of all children in both malnourished and normal samples. Identifying and studying the prevalence of other physical problems in both groups. Collect the dietary intake of each child through a 24 hr. recall questionnaire. Studying the socioeconomical variables of the childrens families and their correlations to the child's health problems.

Results and discussion :

In table (2) below, it is evident that marasmus is 37.1% prevalent in the malnourished group, kwashiorkor is 22.9% widespread among the same group. Anemia is 37.1% common in this same group. In association with these three health problems 5% and 11% calcium deficiency cases in male and female samples respectively were also detected in the physician's reports. There are six cases which are : 4 rickets cases, two of them are females and two other cases of rickets plus marasmus in the male sample. There are two other calcium and vitamin D deficiencies in the female sample.

Table (2) : Distribution of malnourished samples according to child sex and type of illness.

Group	Malnourished group									
Sex	Marasmus		Kwashiorkor		Anemia		Others*		Total	
	n	%	n	%	n	%	n	%	n	%
Males	40	19	21	10	46	21.9	2	1	109	51.9
Females	38	18.1	27	12.9	32	15.2	4	2	101	48.1
Total	78	37.1	48	22.9	78	37.1	6	3	210	100

* Others = 6 (4 rickets; two female cases, and two ricket and marasmus male cases). There are also one calium and another vitamin D deficiencies in the female sample.

As for the anthropometric measurements, table(3) shows the means and the standard deviations of them. In addition comparisons of these measurements with the standards for both the malnourished and the control groups are obviated.

Table(3): Means and standard deviations of the anthropometric measurements for malnourished and control samples.

Anthropometric measurement	Malnourished Preschoolers n = 141			Control Preschoolers n = 100			t	Malnourished breast-fed n = 69			Control breast-fed n = 60			t
	$\bar{X}$	sd	% of standard	$\bar{X}$	sd	% of standard		$\bar{X}$	sd	% of standard	$\bar{X}$	sd	% of standard	
Weight (Kg)	9.18	3.44	69.0	12.95	4.18	97.4	7.407***	6.84	2.51	73.5	9.12	2.03	98.1	5.700***
Height (Cm)	75.96	14.21	83.2	88.01	10.95	96.4	7.429***	63.18	11.93	87.5	70.32	8.11	97.4	4.018***
Head circumference (cm)	45.57	8.8	91.6	50.94	15.96	102.4	3.051**	45.18	15.21	97.8	46.11	5.43	99.8	0.474
Arm circumference (cm)	11.95	2.2	72.4	15.54	1.16	94.2	16.468***	11.99	1.87	75.9	15.66	2.67	99.1	8.908***
Skinfold thickness (mm)	4.67	0.82	41.9	5.73	0.73	59.0	10.707***	4.93	0.73	47.9	6.21	1.14	60.3	7.442***
Chest circumference (cm)	44.66	5.88	94.1	60.62	4.12	107.0	24.783***	43.82	5.11	91.6	47.49	4.76	100.6	4.223***
Muscle circuference (cm)	10.87	4.45	83.65	13.03	3.09	100.23	4.453*	7.33	1.66	60.4	9.27	1.63	76.4	6.690**
Body Mass Index (BMI)	15.909	3.91		16.710	2.58		1.956	17.143	3.83		18.462	1.65		2.596***
Arm circ./Head circ.	0.262	0.24		0.305	0.27		1.265	0.265	0.14		0.340	0.06		4.688
Chest circ./Head circ.	0.98	0.18		1.19	0.21		8.400***	0.97	0.19		1.03	0.18		1.875***
Arm circ./Height	0.16	0.07		0.18	0.06		2.500**	0.19	0.04		0.22	0.04		4.286

* P < 0.05
** P < 0.01
*** P < 0.001

From table (3) it is evident that the malnourished groups are lesser in weight height. Arm circumference, triceps skinfold thickness, chest circumference, and muscle circumference than the controls ($P < 0.001$).

On head circumference the malnourished preschoolers only are lesser than their controls, while on this same measure malnourished breast-fed children did not differ significantly than the controls. On Body Mass Index (BMI), and arm circumference/ height malnourished preschoolers are lesser than their controls ($P < 0.05$, $P < 0.01$) so are the malnourished breast-fed children in comparison with their controls ($P < 0.01$ and $P < 0.001$). Arm circumference/head circumference for the control breast-fed children is significantly better than for the malnourished group ($P < 0.001$).

Malnourished preschoolers and breast-fed have chest circumference/Head circumference 0.98 and 0.97 respectively, which is less than 1, that reflects a failure to develop or a wasting of muscle and fat from the chest wall which is indicative of protein-calorie malnutrition (Krause and Mahan 1979).

A quick look to the weights and heights of the two control groups; it is clear that breast-fed infants are close to the standards,98.1% and 97.4% respectively, whereas the preschooler controls are 2.6 and 3.6 percent less than standards. This seems in agreement with findings by Jansen (1985) in a study done on the nutritional status of preschool children in Egypt.

Table (4) demonstrates socioeconomic characteristics of the children, included in this study, and their families.

Table(4): Means, standard deviations, and percentages of socioeconomical variables for the malnourished and control groups.

Variable	Malnourished preschoolers n = 141		Control preschoolers n = 100		t	Malnourished breast-fed n = 69		Control breast-fed n = 60		t
	X	sd	X	sd		X	sd	X	sd	
Age (mo.)	28.46	13.76	28.45	13.96	0.006	10.16	4.68	10.09	3.96	0.092
Father income	129.96	45.75	313.40	98.71	17.312***	147.13	51.59	311.03	95.06	11.917***
Mother income	56.02	22.60	131.20	43.35	15.881***	61.25	30.61	111.88	36.15	8.515***
Degree of crowdedness	7.98	2.16	6.20	1.11	8.396***	7.33	1.44	6.00	00.00	7.688***
Age at weaning	8.85	4.88	3.40	0.80	13.007***	7.29	4.03	2.53	0.87	9.558***
	n	%	n	%		n	%	n	%	
Father's education :										
Illiterate	48	34.0	2	2.0		25	36.2	4	6.7	
Read and write & primary	41	29.1	7	7.0		24	34.7	2	3.3	
Preparatory & secondary	45	31.9	50	50.0		16	23.2	21	35.0	
College or higher	7	5.0	41	41.0		4	5.7	33	55.0	
Number of wives :										
1	137	97.2	99	99.0		67	97.1	60	100.0	
2	4	2.8	1	1.0		2	2.9	-	-	
Father's occupation :										
Free sector	109	77.3	35	35.0		59	85.5	19	31.7	
Civil job, or professional	132	22.7	65	65.0		10	14.5	41	68.3	
Father smokes :										
Yes	105	74.5	53	53.0		46	66.7	33	55.0	
No	36	28.5	47	47.0		23	33.3	27	45.0	
Mother's education :										
Illiterate	99	70.2	5	5.0		51	73.9	2	3.3	
Read, write, and primary	17	12.1	5	5.0		10	14.5	2	3.3	
Preparatory & secondary	20	14.2	53	53.0		7	10.2	27	45.0	
College or higher	5	3.5	37	37.0		1	1.4	29	48.3	

Table (4) Cont'd.

Variable	Malnourished preschoolers n = 141		Control preschoolers n = 100		Malnourished breast-fed n = 69		Control breast-fed n = 60	
	n	%	n	%	n	%	n	%
Mother suffered during preganancy :								
Yes	104	73.8	8	8.0	46	66.7	-	-
No	37	26.2	92	92.0	23	33.3	60	100.0
Took medicine during pregn. :								
Yes	40	28.4	1	1.0	18	26.1	-	-
No	101	71.6	99	99.0	51	73.9	60	100.0
Received Medical supervision								
Yes	22	15.6	11	11.0	2	10.1	-	-
No	119	84.4	89	89.0	62	89.9	60	100.0
Pregnancy periods								
7 mo.	3	2.1	-	-	2	2.9	-	-
9 mo.	138	97.9	100	100.0	67	97.1	60	100.0
Way of Delivery :								
Ceaserian	5	3.5	4	4.0	1	1.4	22	36.7
Normal	136	96.5	96	96.0	6.8	98.6	38	63.3
Family size :								
2 - 3	15	10.6	49	49.0	2	2.9	25	41.7
4 - 6	34	24.1	40	40.0	28	40.6	29	48.3
more than 6	92	65.2	11	11.0	39	56.5	6	10.0
No. of children in the family :								
1	14	9.9	19	19.0	4	5.8	21	35.0
2	24	17.0	55	55.0	9	13.0	27	45.0
3	34	24.1	17	17.0	18	26.1	6	10.0
4	30	21.3	5	5.0	16	23.2	-	-
5	20	14.2	1	1.0	10	14.5	2	3.3
6 or more children	19	13.5	3	3.0	12	17.3	4	6.7
Number of rooms :								
less than 2	16	11.3	6	6.0	9	13.0	6	10.0
2 - 3	42	29.8	18	18.0	27	39.2	6	10.0
more than 3	83	58.9	76	76.0	33	47.8	48	80.0
House cleanliness :								
bad	66	46.8	-	-	23	33.3	-	-
accepted	56	39.7	18	18.0	25	36.2	2	3.3
good	19	13.5	82	82.0	21	30.5	58	96.7
Lightening :								
bad	8	5.6	-	-	8	11.6	-	-
accepted	104	73.8	22	22.0	44	63.8	15	25.0
good	29	20.6	78	78.0	17	24.6	45	75.0
Fresh air :								
Yes	97	68.8	88	88.0	48	69.6	52	86.7
No	44	31.2	12	12.0	21	30.4	8	13.3
Food storage :								
refrigerator	32	22.7	92	92.0	25	36.2	52	86.7
rundle	26	18.4	6	6.0	14	20.3	4	6.6
others	83	58.9	2	2.0	30	43.5	4	6.6
Water source :								
private tap water	86	61.0	89	89.0	31	44.9	50	83.3
public tap water	22	15.6	8	8.0	13	18.8	6	10.0
water pumb	33	23.4	3	3.0	25	36.3	4	6.7

Table (4) Cont'd.

Variable	Malnourished preschoolers n = 141		Control preschoolers n = 100		Malnourished breast-fed n = 69		Control breast-fed n = 60	
	n	%	n	%	n	%	n	%
Child's birth order :								
1 st	17	12.1	25	25.0	4	5.8	21	35.0
2 nd	24	17.0	50	50.0	10	14.5	27	45.0
3 rd	39	27.7	17	17.0	19	27.5	10	16.7
4 th	24	17.0	6	6.0	16	23.2	-	-
5 th	22	15.6	1	1.0	10	14.5	2	3.3
6 th or up	16	11.3	1	1.0	10	14.5	-	-
Child accepted in the family:								
Yes	88	62.4	85	85.0	41	59.4	60	100.0
No	53	37.6	15	15.0	28	40.6	-	-
Child suffered food allergy :								
Yes	16	11.3	5	5.0	11	15.9	2	3.3
No	125	88.7	95	95.0	58	84.1	58	96.7
Child's appetite :								
bad	62	44.0	1	1.0	20	29.0	-	-
accepted	51	36.2	44	44.0	28	40.6	4	6.7
good	28	19.9	55	55.0	21	30.4	56	93.3
Has problems in swallowing :								
Yes	15	10.6	6	6.0	9	13.0	6	10.0
No	126	89.4	94	94.0	60	87.0	54	90.0
Eat all served food :								
Yes	37	26.2	53	53.0	21	30.4	54	90.0
No	104	73.8	47	47.0	48	69.6	6	10.0
Child know when satisfied :								
Yes	138	97.9	95	95.0	67	97.1	54	90.0
No	3	2.1	5	5.0	2	2.9	6	10.0
Child suffer gastrointestinal problems :								
Yes	139	91.5	11	11.0	61	88.4	-	-
No	12	8.5	89	89.0	8	11.6	60	100.0
Child suffer parasites :								
Yes	11	7.8	5	5.0	7	10.1	6	10.0
No	130	92.2	95	95.0	62	89.9	54	90.0
Child suffer mouth problems								
Yes	12	8.5	5	5.0	7	10.1	6	10.0
No	129	91.5	95	95.0	62	89.9	54	90.0
Child suffer chronic diseases :								
Yes	40	28.4	5	5.0	19	27.5	6	10.0
No	101	71.6	95	95.0	50	72.5	54	90.0
Child receives medicine :								
Yes	139	98.6	13	13.0	67	97.2	6	10.0
No	2	1.4	87	87.0	2	2.8	54	90.0
Sufficient normal nursing :								
Yes	66	46.8	98	98.0	61	88.4	60	100.0
No	75	53.2	2	2.0	8	11.6	-	-

From table (4) it is shown that : for the two preschooler groups and the two breast-fed groups (malnourished and controls) there are no significant differences in age between them that mean the two control groups are matched groups for the malnourished on this variable.

It is obvious in table (4) that parents' income of the two control groups is significantly higher than that of the two malnourished groups ($P < 0.001$). Families of the malnourished samples are more crowded than the families of the two controls ($P < 0.001$). It is worthnoting that the children in the control groups were introduced to solid food beside breast-feeding at an earlier age than the malnourished groups ($P < 0.001$). Some interesting percentages have been revealed in this study concerning socioeconomic variables of the children's families : Percentages of higher education among parents of the control groups are higher than that of the malnourished. Family size is larger for the malnourished groups than for the controls. Houses of the control groups were found to be more suitable and cleaner than those of the malnourished groups. Percentages of refrigators using are higher among the control families than among the malnourished families, 55% of the preschoolers controls and 93.3% of the breast-fed controls are wanted children, while the corresponding percentages for the malnourished are 19.9% and 30.4% respectively.

Finally, swallowing, and gastrointestinal problems are common among the malnourished groups, so are the parasitis and chronic diseases. Good appetite is a common feature for the control groups than it is for the malnourished groups. El-Marasy and El-Bendary (1996) concluded that family socioeconomical factors greatly influence child health, growth and nutrition. In South-west Uganda it was found that for children less than 6 months old various socioeconomical and environmental factors are related to poor nutritional status (Vella et al., 1995).

Table (5) shows nutrients intakes of the two malnourished and their two control groups. It is well evident that the control groups intakes exceeded that of the malnourished intakes from all nutrients.

Table (5) : *Means and standard deviations of several nutrients compared with the standard (RDA, 1989) for the four age groups.*

Age / Nutrients	Malnourished groups (n = 210)											
	0 - <6 months (n = 10)			6 - <12 months (n = 59)			1 - <3 years (n = 120)			3 - <6 years (n = 21)		
	$\bar{X}$	sd	% RDA	$\bar{X}$	sd	% RDA	$\bar{X}$	sd	% RDA	$\bar{X}$	sd	% RDA
Calories	113.7	44.6	17.5	498.9	67.6	58.69	586.6	187.65	45.2	728.4	277.5	40.5
Animal protein	4.2	3.4		6.15	3.4		4.800	3.22		7.8	6.82	
Plant protein	0.9	0.5		3.00	2.16		7.200	6.56		15.7	7.00	
Total protein (g)	5.1	3.6	39.2	9.15	2.86	65.35	12.00	10.76	75.24	23.5	6.96	97.9
Carbohydrate	17.0	4.1		70.35	31.16		82.6	25.3		106.5	39.8	
Fiber	0.09	0.06		0.66	0.42		1.35	0.81		2.0	1.3	
Calcium (mg)	31.20	26.05	7.79	205.35	97.08	34.2	145.2	112.8	18.15	168.0	142.0	21.0
Phosphorus (mg)	49.50	33.65	16.50	187.2	74.52	37.5	260.7	127.6	32.29	433.0	214.0	54.1
Animal Iron	0.33	0.36		0.59	0.51		0.66	0.61		1.4	0.97	
plant iron	0.33	0.29		1.53	0.98		3.00	2.16		5.0	2.50	
Total iron (mg)	0.66	0.28	11.0	2.12	0.99	21.2	3.66	1.98	36.6	6.4	2.70	64.0
Sodium	33.0	31.07		226.5	111.9		479.25	311.09		823.4	366.0	
Potassium	106.5	61.12		321.0	117.8		469.65	327.14		718.7	388.0	
Zinc (mg)	0.27	0.23	5.4	0.75	0.37	15.0	2.1	1.64	21.0	6.5	3.9	65.0
Magnesium	9.15	5.71	22.88	43.50	17.20	72.6	56.1	41.12	70.13	64.0	24.0	53.3
Vitamin A (µg)	34.2	25.8	9.15	75.00	49.18	20.1	95.25	81.33	23.81	114.2	93.2	22.8
Vitamin D (µg)	9.3	7.13	124.0	8.25	6.91	82.5	9.00	6.73	90.0	10.0	8.8	100.0
Vitamin E (mg)	0.23	0.21	7.8	0.60	0.46	15.0	0.54	0.48	9.0	0.43	0.39	6.1
Vitamin B1 (mg)	0.09	0.05	30.0	0.09	0.04	22.5	0.24	0.19	34.2	0.47	0.22	52.4
Vitamin B2 (mg)	0.08	0.06	19.95	0.29	0.18	57.75	0.54	0.41	67.5	1.00	0.64	90.9
Vitamin B3 (mg)	0.23	0.17	4.60	0.75	0.44	12.5	1.76	0.97	19.5	3.4	1.80	28.3
Vitamin B6 (mg)	0.05	0.03	16.7	0.14	0.08	23.3	0.24	0.19	24.0	0.45	0.22	40.9
Vitamin B12 (µg)	0.24	0.23	79.5	0.46	0.43	91.2	57.0	0.54	81.0	0.76	0.75	76.0
Vitamin C (mg)	0.21	0.19	0.70	0.89	0.83	2.55	2.55	1.81	6.40	6.60	6.30	14.7
Folate (µg)	10.35	9.21	41.25	32.85	20.71	93.9	54.78	44.61	109.6	71.25	70.33	98.0
Animal fat	1.89	0.97		11.4	8.62		8.0	7.21		7.7	7.2	
plant fat	0.92	0.74		8.7	2.33		15.1	11.70		15.5	11.0	
Total fat	2.81	1.86		20.1	7.13		23.1	9.16		23.2	11.6	

Age / Nutrients	Control groups (n = 160)											
	0 - <6 months (n = 9)			6 - <12 months (n = 51)			1 - <3 years (n = 85)			3 - <6 years (n = 15)		
	$\bar{X}$	sd	% RDA	$\bar{X}$	sd	% RDA	$\bar{X}$	sd	% RDA	$\bar{X}$	sd	% RDA
Calories	522.0	219.17	80.4	750.00	319.13	88.24	851.0	277.8	65.4	950.0	319.6	52.88
Animal protein	11.8	9.63		17.5	5.09		9.6	4.5		7.25	6.18	
Plant protein	0.90	0.90		4.25	3.66		17.6	7.6		17.75	11.43	
Total protein (g)	12.7	6.18	97.8	21.75	11.87	155.36	27.2	6.65	170.0	25.00	12.76	104.2
Carbohydrate	72.5	41.12		99.6	42.73		121.65	74.38		157.65	94.82	
Fiber	0.08	0.07		0.85	0.61		2.31	2.19		2.36	2.15	
Calcium (mg)	629.1	191.7	157.28	391.2	182.6	65.25	193.5	126.5	24.2	187.5	124.1	23.44
Phosphorus (mg)	482.55	260.3	160.8	305.85	119.2	61.2	385.5	78.13	48.2	555.0	325.7	69.38
Animal Iron	0.33	0.17		2.50	1.17		0.75	0.43		0.54	0.32	
plant iron	0.38	0.21		3.33	3.11		3.45	3.41		6.63	4.48	
Total iron (mg)	0.71	0.23	11.83	5.83	2.94	58.30	4.20	3.16	42.0	7.17	3.89	71.7
Sodium	240.45	101.2		294.45	158.2		832.5	478.9		948.5	586.5	
Potassium	857.4	430.7		601.05	260.37		636.0	349.7		896.88	411.02	
Zinc (mg)	3.15	2.12	63.0	1.5	0.79	30.0	2.85	1.76	28.5	8.25	6.51	82.5
Magnesium	65.25	37.06	163.13	37.0	35.11	61.8	81.0	46.92	101.3	58.8	27.15	49.0
Vitamin A (µg)	172.65	73.53	46.05	131.25	92.18	35.0	175.0	84.13	43.75	241.0	139.16	48.2
Vitamin D (µg)	4.05	3.12	54.0	3.3	1.93	32.85	10.05	7.18	100.5	26.25	21.18	263.0
Vitamin E (mg)	0.26	0.18	8.66	1.1	0.79	27.5	0.66	0.58	10.95	2.0	1.93	28.58
Vitamin B1 (mg)	0.28	0.25	91.95	0.24	0.21	60.0	0.69	0.39	98.6	0.61	0.49	67.80
Vitamin B2 (mg)	0.71	0.39	177.5	0.62	0.34	123.9	0.60	0.51	75.0	1.25	0.97	113.6
Vitamin B3 (mg)	1.16	1.11	23.25	4.2	3.85	70.0	2.7	2.31	30.0	4.40	3.17	36.63
Vitamin B6 (mg)	0.17	0.14	56.25	0.15	0.11	25.0	0.27	0.17	27.0	0.66	0.58	59.75
Vitamin B12 (µg)	0.59	0.57	198.0	0.81	0.47	162.0	0.65	0.27	92.8	1.04	1.01	104.0
Vitamin C (mg)	1.38	0.68	4.65	0.89	0.79	2.55	2.55	1.31	6.3	11.6	8.43	25.75
Folate (µg)	23.85	10.14	95.4	34.50	19.16	98.6	118.5	98.3	237.0	160.38	86.1	213.75
Animal fat	19.05	7.09		25.2	6.16		8.8	6.93		2.13	1.37	
plant fat	0.89	0.38		4.2	4.13		19.4	11.56		22.25	19.56	
Total fat	19.94	6.83		29.4	7.19		28.2	10.68		24.38	16.70	

As for table (6) it shows the correlation coefficients between socioeconomical variables such as father, and mother education, family size, family income, mother working hours with other variables related to the child health problems.

Table (6): Correlation coefficients between some socioeconomic variables, and mother and child health variables.

Variable	Father's education	Mother's education	Degree of crowdedness	Mother received medical care	Mother took medicine	Period of pregnancy	Mother suffered during preg	Child suffers chronic disease	Child receives medicine	Child suffers mouth &teeth problems	Child suffered parasites	Child suffers stomach problems	Child suffers food allergy	Child has problems in suckling & swallowing	Child's appetite
Father's education	1.00	0.34**	-0.21*	0.20*	-0.24*	0.07	-0.44**	-0.37**	-0.21*	-0.17	-0.18	-0.37**	-0.27**	-0.18	0.29**
Mother's education	0.34**	1.00	-0.27**	0.32**	0.04	0.11	-0.58**	-0.34**	-0.08	0.01	0.01	-0.11	-0.28**	-0.03	0.31**
Family size	-0.35**	-0.46**	0.63**	0.03	0.23	0.12	0.20	-0.24*	0.02	0.02	0.07	0.05	0.30**	0.02	0.18
Number of children in the family	-0.31**	-0.22*	0.47**	-0.02	0.10	0.09	0.33**	0.32**	0.22*	0.30**	0.25*	0.41**	0.13	0.31**	0.18
Degree of crowdedness	-0.21*	-0.27**	1.00	-0.25*	0.19	0.06	0.19	0.24*	0.20*	0.15	0.12	0.20*	0.21*	0.23*	0.19
Family income	0.65**	0.68**	-0.22*	0.06	-0.20	0.04	0.56**	-0.19	-0.01	0.03	0.03	-0.05	-0.29**	0.00	0.21*
Father smokes	-0.16	-0.14	0.05	0.00	0.09	-0.03	-0.22*	-0.03	0.02	0.12	0.00	0.01	0.01	0.02	0.01
Mother working hours	0.18	0.24*	-0.23*	0.08	0.05	0.58**	0.09	0.12	0.19	0.08	0.05	0.18	0.01	0.22*	0.18
Mother received medical care	0.20*	0.32**	-0.25*	1.00	0.24*	0.03	0.11	-0.01	-0.04	0.01	-0.06	-0.06	0.20*	-0.10	0.12
Mother took medicine (during pregnancy)	-0.24*	0.09	0.19	0.24*	1.00	-0.10	0.48**	0.11	0.03	0.03	0.08	0.09	0.12	0.03	-0.27**
Period of pregnancy	0.07	0.11	0.06	0.03	-0.10	1.00	-0.13	-0.03	0.00	-0.07	0.03	-0.01	-0.01	0.03	0.12
Mother suffered during preg.	-0.44**	-0.58**	0.19	0.12	0.48**	-0.13	1.00	0.12	0.03	-0.03	-0.01	0.10	0.21*	0.06	-0.20*
Child's birth order	-0.48**	-0.45**	0.25*	-0.01	0.11	0.11	0.37**	0.26**	0.24*	0.24*	0.12	0.30**	0.11	0.29**	0.19
Was the child wanted	0.20*	0.20*	-0.18	-0.09	-0.06	0.06	-0.24*	-0.05	-0.06	1.00	0.03	-0.08	-0.09	-0.16	0.08
Child's appetite	0.29**	0.31**	0.19	0.12	-0.27**	0.12	-0.20*	-0.31**	-0.21*	-0.41**	0.19	-0.24*	-0.28**	-0.22*	1.00

* P < 0.05
** P < 0.01

From table (6) it is seen that fathers and mothers level of education correlates negatively significant with : number of family members, number of children in the family, degree of corowdedness, and with the child's birth order. Parents level of education correlates positively significant with family income, mother receives medical care during pregnancy, acceptance of the child, and with the child's appetite.

Level of parents education correlated negatively significant with : frequency of chronic diseases , food allergies , and stomach problems in the children. It correlated positively significant with the child's appetite.

Family income correlated positively significant with the level of father education and mother education' however, it correlated negatively significant with degree of crowdedness,

chance of mother falls sick during pregnancy, and takes medicine, and with the frequency of children allergic reaction to food. Child birth order correlated positively significant with the probability the child suffers chronic diseases, mother suffers during pregnancy, child suffers mouth and teeth problems, child suffers stomach problems, and the childs problems in suckling and swallowing. Child's appetite is correlated (affected) negatively with mother took medicine during pregnancy, with mother suffered during pregnancy, with child inflected with chronic diseases, with the child receiving medicine, with the child suffering mouth and teeth problems, with the child suffering stomach problems, with the child suffering food allergy, and with the child's problems in suckling and swallowing.

Table (7) contains correlation coefficient between anthropometric measurements, nutrient intakes, and several selected social variables believed to have obvious effects on the prior two group of variables.

Table (7): Correlation coefficients between anthropometric measurements, nutrient intakes, and some selected socioeconomic variables.

Variables	Arm circumference	Arm circum/ Head circum.	Arm circum/ Hight	Body Mass Index	Chest circumference	Chest circum/ Head circum	Height (cm)	Muscle circumference	Triceps skinfold thickness	Weight (Kg)	Father eductation	Mother eductation	Family Income	Family Size	Child birth order
Calories	0.09	0.02	.52**	0.20*	.20*	.13	.50**	.32**	0.20*	.32**	0.23*	0.20*	0.29**	-0.66**	-0.24*
Animal protein	0.14	.04	.18	.19	-.13	.04	-.02	.14	.25**	.17	0.15	0.17	0.20*	-0.19	-0.33**
Plant protein	-0.23*	.08	-.45**	.11	-.42**	.14	.00	.30**	.03	.44**	0.28**	0.30**	0.29**	-.25*	-0.22
Total protein	.09	.04	-.46**	.17	.26**	.14	.06	.32**	.18	.31**	0.24*	0.23*	0.27**	-0.21*	-0.18
Carbohydrate	.09	.01	-.53**	.19	.30**	.13	.02	.31**	.17	.34**	0.14	-0.18	0.25**	-0.14	-0.12
Fiber	.05	.01	-.06	-.00	.07	.02	.09	.14	-.07	.08	-0.04	0.09	0.00	-0.00	-0.17
Calcium	.32**	.11	-.16	.15	-.35**	-.01	.20*	.25*	.13**	.23*	0.15	0.16	0.26**	-0.21*	-0.22*
Phosphorus	-.01	-.00	-.41**	-.16	.11	.10	.32**	.29**	.24*	.20*	0.19	0.19	0.30**	-0.19	-0.15
Animal iron	.11	.06	-.09	-.05	.18	.08	.07	.18	-.05	.13	0.13	0.12	0.01	0.18	-0.18
Plant iron	.32**	.13	-.35**	.07	.46**	.13	.01	.24*	.09	.47**	-0.07	0.14	0.18	-0.04	-0.21*
Total iron	.17	.05	-.29**	.08	.30**	.08	.01	.09	.08	.30**	0.19	0.17	0.07	-0.00	-0.20*
Sodium	.11	.03	-.44**	.12	.29**	.13	.06	.30**	.14	.32**	0.19	0.17	0.07	-0.00	-0.20*

Table (7): Cont'd.

Variables	Arm circum-ference	Arm circum/ Head circum.	Arm circum Height	Body Mass Index	Chest circum-ference	Chest circum/ Head circum	Height (cm)	Muscle circum-ference	Triceps skinfold thickness	Weight (Kg)	Father eductation	Mother eductation	Family income	Family Size	Child birth order
Potassium	-.04	-.01	-.38**	.14	.05	.10	.05	.22*	.231*	.16	0.16	0.19	0.27**	-0.17	-0.11
Zinc	.16	.08	-.39**	.11	.14	.07	.02	.20*	.09	.23*	-0.14	0.14	0.29**	-0.06	-0.12
Magnesium	.07	.04	-.31**	.11	.14	.07	.01	.20*	.09	.23*	-0.03	0.03	0.14	-0.10	0.16
Vitamin A	-.10	-.05	-.12	.06	-.08	.01	-0.2	.06	.14	-.03	0.21*	0.25*	0.14	-0.04	-0.14
Vitamin D	.10	.06	-.10	.06	.18	.09	.20*	-.00	.10	.20*	0.15	0.16	0.01	-0.28	-0.16
Vitamin E	.01	.01	-.10	.00	.02	.01	.00	.07	.05	.03	-0.03	0.09	-0.02	-0.04	-0.14
Vitamin C	.26**	.21	-.16	-.04	.32	.20	.38**	.33**	-.04	.32**	0.22*	0.22*	-0.13**	-0.02	-0.16
Vitamin B1	-.07	-.03	-.04	.04	.08	-.01	-.04	.09	.14	-.05	0.10	-0.10	0.11	-0.01	-0.15
Vitamin B2	.10	.06	-.31**	.10	.19	.11	.06	.33**	.18	.25**	0.20*	0.23*	0.26**	-0.20*	-0.19
Vitamin B3	-.09	-.05	-.06	.06	-.07	-.01	-.04	.07	.11	-.05	0.05	0.17	0.09	-0.05	-0.12
Vitamin B6	.01	.01	-.21*	.09	.06	.04	.08	.13	.10	.11	0.06	0.13	0.15	-0.12	-0.18
Vitamin B12	.07	.02	-.03	.01	.07	.01	.09	.03	.03	.09	0.33**	0.13	0.23*	0.08	-0.14
Folate	.11	.02	-.31**	.03	.25**	.08	.07	.16	-.02	.31**	0.16	-0.11	0.19	-0.04	-0.18
Father education	0.46**	0.36**	0.33**	-0.14	0.29**	0.16	0.16	0.00	0.41**	0.09	1.00	0.34**	0.65**	-0.35**	-0.49**
Mother education	0.46**	0.49**	0.30**	0.04	0.29**	0.17	0.19	-0.08	0.48**	0.21*	0.34**	1.00	0.68**	-0.46**	-0.45**
Family income	0.47**	0.33**	0.35**	0.10	0.27**	0.06	0.16	-0.21*	0.59**	0.21*	0.65**	0.68**	1.00	-0.51**	-0.39**
Family size	-0.38**	-0.28**	-0.21**	-0.10	-0.26**	-0.12	-0.28	0.19	-0.59**	-0.23*	-0.35**	-0.46**	-0.51**	1.00	0.39**
Child birth order	-0.39**	0.15*	0.16*	-0.00	0.16	0.08	-0.14	-0.04	-0.31**	0.08	-0.49**	-0.45**	-0.39**	0.39**	1.00

It is clear from table (7) that : Father education has strong positive relationships with; plant protein, vitamin B_{12} ($P < 0.01$), kcalories, total protein, vitamine A, vitamin C, and vitamin B_2 ($P < 0.05$). It has significantly positive relationships with; arm circumference, arm circumference/ Head circ., arm circ./ Height, chest circ., and triceps skinfold thickness ($P < 0.01$).

Mother education has significantly positive relationships with plant protein, ($P< 0.01$), calories, total protein, vitamin A, vitamin C, and vitamin B_2 ($P < 0.05$). It has strong positive correlations also with : arm circ., arm circ./Head circ., arm circ./Height, chest circ., triceps skinfold thinkness ($P < 0.01$), and with weight ($P < 0.05$).

Family income correlated significantly positive with; calories intake., plant protein, total protein, calcium, phosphorus, potassium, zinc, vitamin C, vitamin B_2 ($P < 0.01$), animal protein, and vitamin B_{12} ($P < 0.05$). It correlated also significantly positive with : Arm circ., arm circ./Head circ., arm circ./Height, chest circ., triceps skinfold thickness

(P < 0.01), muscle circ., and weight (P < 0.05).

Family size : correlated highly negatively significant with; calories (P < 0.01), plant protein, total protein, calcium, and vitamin B2 (P < 0.05). It correlated negatively also with; arm circ. arm circ./Head circ., chest circ., triceps skinfold thickness (P < 0.01), arm circ./ Height, height, and weight (P < 0.05).

Child birth order : correlated negatively significant with; animal protein (P < 0.01), calories, plant protein, calcium, plant iron, total iron, and sodium (P < 0.05). It correlated negatively also with; arm circ., and triceps skinfold thickness (P < 0.01).

Conclusion :

The results of this research are in agreement with previous research; Gabr et al., (1990) had found that mean nutritional status decreased with family size increase. Family income and fathers' educational level was the most important risk factor of malnutrition, mothers' educational level, number of siblings were not as important if family income was among the predictors of malnutrition (Victora, 1989). Pattern of food consumption in Egypt is affected by family income as animal proteins and legumes are consumed infrequently in lower-income areas (El-Attar et al., 1975). In South-west Uganda it was found that for children less than 6 months old various socioeconomical and environmental variables are related to poor nutritional status (Vella et al., 1995).

In conclusion common illness found subsequent to malnutrition among the malnourished samples are; anemia, marasmus, kwashiorkor, calcium deficiency, rickets, and vitamin D, in decreasing order.

It was found that the malnourished groups (preschoolers and breast fed) were lagging behind the control groups, as well as the standards of all the anthropometric measurements (Jelliffe, 1966). Inaddition, breat-fed controls are better and closer to the standards on weights and heights, than the preschoolers controls in agreement with previous findings.

Food allergy, bad appetite, swallowing problems, gastrointestinal problems, parasites, and chronic diseases are found to be more frequent in the malnourished groups than in their control counterparts .

On nutrient intakes, it is found that the malnourished groups are way behind the Recommend Dietary Allowances (1989) whereas the control groups either satisfied the Allowances or fell just short of them.

Finally, it is apparent from the results of this study that as levels of parents' education increase incomes from their jobs increase, family size decreases, and the child would have few number of siblings to share him the attention and care of his/her parents.

Mothers' education is most relevant to house cleanliness and suitability, and consequently less crowdedness at home. As there is a few number of children in the family, mother may not suffer as many illnesses, and she would not have to take drugs. The child will also be healthier and have little chance to get sick especially from gastrointestinal and chronic diseases.

To help improve the nutritional status and health of the children, it is recommended that :

1. Regular check up of infants and children at Maternal and Child Health (M.C.H.) centers will be of great help in early detection and management of cases of malnutrition.
2. Dietary courses and child nursing programs should be included in the curriculum of girls secondary schools as they will be future mothers.
3. Propper child spacing and family planning for propper care and good dietary intake of the child so that the problem of malnutrition will be overcome.
4. Mothers of malnourished children should be trained during their stay in hospitals with their children concerning the propper way of weaning, the ideal foods given to infants and the propper management of malnourished babies, so that they will spread these knowledge to their neighbors and friends after discharge.

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دراسة مقارنة لأثار سوء التغذية في عينة من الرضع وأطفال ما قبل المدرسة ومجموعة أخري ضابطة بمحافظة المنوفية

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قسم التغذية وعلوم الأطعمة

كلية الاقتصاد المنزلي – جامعة المنوفية

يشير الباحثون إلى أن متوسط أوزان وأطوال الرضع المصريين تتساوى تقريباً مع تلك التى للرضع فى الدول المتقدمة خلال الشهور الأولى من حياة الرضيع ، هذه المتوسطات المصرية تتخلف بعد ذلك عن مثيلاتها خلال سنوات الطفولة المبكرة وعلى ذلك فالدراسة الحالية تهدف إلى فحص عينة من الرضع وأطفال ماقبل المدرسة الذين يعانون من سوء التغذية ؛ أولاً : لترصد الأمراض فى الرضع وفى أطفال سن ماقبل المدرسة الناتجة عن سوء التغذية. ثانياً : الحصول على المقاييس الجسمية للرضع وأطفال ماقبل المدرسة المصابين بسوء التغذية ومقارنتها بمجموعة ضابطة من الأطفال الرضع والأطفال في سن ماقبل المدرسة غير المصابين ومقارنة كافة النتائج بالقياسية . ثالثاً : رصد المشاكل الصحية الأخرى بين الرضع وأطفال ماقبل المدرسة . رابعاً : دراسة مايستهلكه الرضيع وطفل ماقبل المدرسة من عناصر غذائية . خامساً : دراسة الظروف الاجتماعية والإقتصادية لأسر هؤلاء الأطفال كأسباب محتملة لسوء التغذية ومايترتب عليها من أمراض .

تكونت عينة الدراسة من مجموعتين : عينة «مرضية» يعانى أفرادها من سوء التغذية – حسب التشخيص الطبى – ويترددون على المستشفيات للعلاج وهذه العينة تتكون من : ٦٩ طفلاً رضيعاً ، ١٤١ طفلاً فى سن ماقبل المدرسة ، وعينة أخرى لايعانى أفرادها من سوء التغذية « ضابطة » وتتكون من : ١٦٠ طفلاً ، منهم ٦٠ طفلاً رضيعاً ، ١٠٠ طفلاً فى سن ماقبل المدرسة . وقد أخذوا عشوائياً من المترددين على مراكز رعاية الأمومة والطفولة للتطعيم والكبار منهم مقيدين بدور الحضانة . وقد أخذت جميع هذه العينات المرضية والضابطة من مدن شبين الكوم والشهداء والباجور وتلا بمحافظة المنوفية .

تشير نتائج هذه الدراسة إلى شيوع المراسمس فى العينة المرضية بنسبة ١٩٪ فى الذكور ، ١ر١٨٪ فى الإناث و الكواشيوركور بنسبة ١٠٪ فى الذكور و٩ر١٢٪ فى الإناث . والأنيميا بنسبة ٩ر٢١٪ فى الذكور و ٢ر١٥٪ فى الاناث ، ووجد الكساح بنسبة ١٪ فى الإناث ، وكانت نسبة المراسمس والكساح معاً ١٪ فى الذكور فقط . كذلك وجدت حالات نقص الكالسيوم مصاحبة لأمراض سوء التغذية السابقة بنسبة ٥٪ فى الذكور ، ١١٪ فى الإناث .

وبمقارنة المقاييس الجسمية للعينة المرضية بالعينة الضابطة من نفس العمر تبين أن : وجود فروق دالة احصائياً عن مستوى ٠ر٠٠١ فى الوزن والطول ومحيط الذراع وسمك طية الجلد ومحيط العضلات ومحيط الصدر ونسبة محيط الذراع إلى الطول ومحيط الذراع إلى محيط الرأس ، وقد كانت الفروق بينهما فى كتلة الجسم دالة عند مستوى ٠ر٠١ كما كان محيط الرأس عند العينة الضابطة لأطفال ماقبل المدرسة أفضل منه عن العينة المرضية عند مستوى ٠ر٠١ وكل الفروق السابقة كانت لصالح العينات الضابطة .

وبالنسبة لمدى شيوع الأمراض فقد بينت النتائج شيوع أمراض الحساسية لبعض الأطعمة ، وفقدان الشهية ، وصعوبة البلع والطفيليات والإضطرابات المعدية – المعوية ، ومشاكل الفم والأمراض المزمنة بنسبة أكبر فى أطفال العينة المرضية عن أطفال المجموعة الضابطة. كما كان إستهلاك أطفال العينة الضابطة من الأطعمة أكبر بكثير من إستهلاك أطفال العينة المرضية .

كما أظهرت النتائج أنه كلما زاد تعليم الأب زاد تعليم الأم وزاد الدخل الكلى للأسرة وقل عدد الأطفال في الأسرة وبالتالى تقل درجة الإزدحام فى المنزل وتقل الأمراض فى الأسرة وبالتالى يقل تناول أفرادها للأدوية وتزيد شهية الطفل وبالتالى يزيد إستهلاك الطفل للأطعمة وبناء عليه تزيد المقاييس