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Vitamin A Status amongst Malnourished Children under 5 Years Old Attending Ard El-Insan Association in Gaza City

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Abstract

Malnutrition in children often begins at birth and is associated with retarded physical and cognitive development. Vitamin A is a fat soluble vitamin and an essential micronutrient needed in small amounts for the normal functioning of the visual system, maintenance of cell function for growth, epithelial integrity, red blood cell production, immunity and reproduction. This study aimed to investigate vitamin A status among malnourished children aged under 5 years attending Ard El-Insan Association. This cross sectional study consisted of 150 malnourished children less than 5 years old from both sexes. Questionnaire interview with parents was used. Anthropometric measurements (weight, length and height) were taken. Blood samples were drawn for determination of serum vitamin A, iron, zinc and Hb. Statistical analysis was performed using SPSS version 18.0. The study population was (150) cases; (53.3%) males and (46.7%) females. The majority of surveyed children (90.7%) received immediate breastfeeding, and more than two third (71.3%) of them were breast fed exclusively. Vitamin A status among malnourished children showed (26%) of them had serum vitamin A level below (300)µg/L. Moreover, there was a significant association between each of underweight and birth weight of the studied children with serum vitamin A level. The majority of surveyed children (82.7%) were anemic and (29%) of them, their serum vitamin A level was below normal. The present study provided base line information regarding vitamin A status among malnourished children under 5 years old in Gaza city. Interventions to improve children nutritional status must be in concern.

Keywords:
Vitamin A status,
Anthropometric measurements,
Malnutrition,
Children under 5 years old,
Gaza city.

1. Introduction:

This study focuses on vitamin A (VA) status among malnourished children under 5 years old attending Ard El-Insan (AEI) services in Gaza city. Malnutrition in children often begins at birth and is associated with retarded physical and cognitive development. This, in turn, yields serious implications for the overall national development agenda. Palestine is an exception as malnutrition appears among children under-five. Between the years 2000 a huge increase of (60.0%).

Currently, (11) out of (100) children under-five suffer chronic malnutrition including (11.3%) in the West Bank (WB) and (9.9%) in Gaza Strip (GS) (Palestinian Central Bureau of Statistic (PCBS), 2011).

Micronutrient deficiencies, a significant cause of malnutrition, are associated with ill health among populations in developing countries. Deficiencies in vitamin A, iodine and iron are known to be especially prevalent and are associated with a range of mild (often reversible) to severe (often irreversible) effects. Known clinical outcomes of micronutrient deficiencies include impaired growth and cognitive development, poor birth outcomes, anemia, cretinism and blindness (MARAM, 2004).

Vitamin A is a fat soluble vitamin and an essential nutrient needed in small amounts for the normal functioning of the visual system, and maintenance of cell function for growth, epithelial integrity, red blood cell production, immunity and reproduction (WHO, 2009).

Vitamin A is found in several food sources and adequate amounts are generally provided by a healthy, balanced diet with no need for extra supplementation. VA is available in both animal (eggs, cheese, yoghurt and spreads) and plant foods (orange and yellow fruits and vegetables), as well as in the form of artificial supplements (Mandal, 2014).

Vitamin A deficiency (VAD) is a major nutritional concern in poor societies, especially in lower income countries. The main underlying cause of VAD as a public health problem is a diet that is chronically insufficient in VA that can lead to lower body stores and fail to meet physiologic needs (e.g. support tissue growth, normal metabolism, resistance to infection) (WHO, 2009).

In South Asian developing countries, economic constraints, sociocultural limitations, insufficient dietary intake, and poor absorption leading to depleted vitamin A stores in the body have been regarded as potential determinants of the prevalence of VAD (Akhtar et al., 2013).

India has the highest prevalence of clinical and subclinical VAD among South Asian countries; (62%) of preschool children were reported to be deficient in vitamin A. These dramatic results suggested high mortality rate, leading to an annual (330,000) child deaths. In Bangladesh, it showed that approximately (1.5%) of (381) school children aged (11-16) years to suffer from subclinical VAD (i.e. serum retinol <0.70 µmol/L). Another study reported that 51% pregnant women had deficit in diets to meet RDA for VA and (18.5%) manifested VAD (serum retinol <0.70 µmol/L) suggesting VAD to be highly prevalent among pregnant women (Akhtar et al., 2013).

Another study found that (38.7%) of studied schoolchildren have low serum retinol in Burkina Faso and VAD was significantly higher in public than private schools (Daboné et al., 2011).

Approximately, half of the children (51.1%) aged (6-9) years old in Ethiopia has shown VAD (<0.70µ mol/L) (Kassaye et al., 2001).

In Jordan, a longitudinal study assessed growth and vitamin A status of schoolchildren after earlier surveys had linked stunting among Jordanian children to dietary zinc and iron inadequacies. A group of (1,023) subjects ages (5.5) to (9.9) years were randomly recruited for study from seven disadvantaged semirural districts. Baseline assessment included anthropometric and laboratory data with the relevant dietary information .At baseline there was a (19.9%) prevalence of stunting, (18.8%) for anemia and (21.8%) for subclinical VAD. Furthermore about (60%) of subjects had serum retinol levels in the range (200-300) µg/L (Khatib, 2002).

In Egypt, food consumption studies showed that there were insufficient intake of vitamin A, iron and zinc. VAD among preschoolers and their mothers is considered to be a subclinical, mild-to-moderate and public health problem (FAO, 2003).

In Palestine, vitamin A intake was evaluated by (24) hour food recall of children's diets by their mothers among (477) children aged (12-59) months. Results were expressed as percentage of children with intakes below (80%) of RDAs. Among children aged (1-3) years, half of the children living in the WB were below the cut-off point. In the GS, (65%) of the children were below (80%) of RDAs. These percentages were higher among children aged (4-5) years: (64%),(71%) in the WB and GS, respectively had insufficient intakes of VA (FAO, 2005).

In addition, nutritional assessment conducted on (2,027) children ages (13-59) months in WB and GS revealed that (79.5%) of (1-3) years and (88.1%) of (4-5) years were deficient in daily VA intake compared to WB (64.1%) for (1-3) years and (75.1%) for (4-5) years (Abdeen et al., 2003).

Moreover, MARAM Project (2004) showed that (22%) of children aged (12 – 59) months were found to have low VA plasma levels (<200 µg/L). Furthermore, more than half of the children participating in the study

(53.9%) had levels of VA in the range of (200-299 µg/L), meaning that (75.9%) of children had VA levels below (300µg/L). In addition, results showed a significant difference between the prevalence of VAD in the WB (18.9%) compared to the GS (26.5%) (MARAM, 2004).

The World Health Organization (WHO) recommended that children who are (6–59) months of age with severe acute malnutrition should receive the daily recommended nutrient intake of VA throughout the treatment period. Children with severe acute malnutrition should be provided with about (5000) IU vitamin A daily, either as an integral part of therapeutic foods or as part of a multi-micronutrient formulation (WHO, 2015).

2. Problem statement:

- Prevalence of VAD among children in developing or low income countries.
- Globally, malnutrition is the most important risk factor for illness and death.
- According to study conducted in 2004 among children aged (12 to 59) months which showed that more than half of the studied children had VAD meaning that VAD is a serious public health problem in the Occupied Palestinian Territory (OPT) and this study finding requires further investigation.

3. Methodology and solutions:

A. Methodology:

1) Study Design:

Cross sectional study was applied among malnourished children in Gaza city .

2) Sample Population:

The sample population was malnourished children under 5 years old in Gaza city.

3) Sample Size:

The sample size was consisted of (150) malnourished children (male and female) who were attending AEI services in the Gaza center.

4) Study period:

The study was conducted during the period from October, 2015 to June,2016.

5) Questionnaire Interview:

A meeting interview was used for filling the questionnaire. The questionnaire was based on AEI Benevolent Association questions. The questionnaire included questions about child personal data (area, age, and sex); occupation of children parents; socioeconomic status (family income, source of income, number of household and type of home); child anthropometric measurements (bodyweight, length/height); child neonatal history (birth weight, admission to ICU and neonatal Jaundice) and child nutrition history (immediate breast feeding, exclusive breast feeding, duration of breastfeeding and introducing each of infant formula and complementary food).

6) Blood Sample Collection and Processing:

The blood sample collection process began with blood collection at AEI, followed by immediate processing at stationary laboratories. The samples then transported to storage at (-20°) C in the central laboratories.

Five ml venous blood samples (whole blood) were obtained from each child and divided into EDTA tube (1.0 ml) and vacutainer plain tube (4.0 ml). Vacutainer plain tubes were left for short time to allow blood to clot, and then clear serum samples were obtained by centrifugation at 4000 rpm for 5 minutes. CBC was done in the same day of

collection. The separated serum was placed in plain tubes and sealed. Samples that used within 5 days were stored at 2-8˚C, otherwise samples stored at -20˚C to avoid loss of bioactivity and contamination.,

7) Anthropometric Measurements:

Anthropometric measurements (weight and height) of the children were measured by a well trained nurse to determine their nutritional status. Weight was measured in kg (to the nearest 100 grams) using an electronic digital scale (Seca model 770; Seca Hamburg, Germany) and its accuracy was periodically verified using reference weights. The child was weighed in light clothing, by determining the mean weights of light clothes dressed, and a correction for the clothing was made during weighing by subtracting 100 grams from each children weight.

Length was measured in cm (measured to the nearest mm) using a pediatric measuring board. Children were measured in a recumbent position (lying down). The software program for assessing growth and development of the world's children was used to make comparisons to the reference standards. The software program combines the raw data on the variables (age, sex, length, weight) to compute a nutritional status index such as weight-for-height, weight-for-age and height-for-age.

8) Biochemical Analysis:

a) Vitamin A Assay:

Serum vitamin A was measured by ELISA technique using human vitamin A, vitamin A ELISA kit. Microplate Reader was used to perform qualitative or quantitative determination of samples in accordance with Lamber-Beer law (MR-96A, SHENZHEN MINDRAY BIO-MEDICAL ELECTRONICS CO., LTD. China).

b) Zinc assay:

Zinc was analyzed by spectrophotometric methods, using a colorimetric biochemistry auto analyzer system (Chem.Well, Awareness Technology Inc.).

c) Iron assay:

Iron was analyzed by spectrophotometric methods, using a colorimetric biochemistry auto analyzer system (Chem.Well, Awareness Technology Inc.).

d) Hematological analysis:

Blood samples were processed by an automatic counter for haemoglobin Concentration (ABX Micros ES60, HORIBA ABX Diagnostics).

9) Data Analysis:

Data processing and analysis was carried out using the Statistical Package for Social Sciences (SPSS) version 18.0. The cross tabulations and the Chi-square tests at a significance level of (5%) were used to investigate the statistical correlation between the VA level and other factors.

B. Solutions:

According to survey, Ard El-nsan association has been the only organization which gives medical treatment for the children who suffer from malnutrition. Therefore, it is important that the decision makers and stakeholders should help AEI in this regard. In addition, based on the survey of parents, it has been clear that they haven't got sufficient information about the importance of vitamin A and other micronutrients for their children. So, I suggest that:

- Protocols that include micronutrient practices, based both on Palestinian needs and international standards.
- Raising the level of nutritional knowledge among pregnant women and mothers on the health of children.
- The need for clinical nutritionist to be present within the follow-up group for malnourished children.
- Presence of nutritionist in each school to provide nutritional advice to children.

4. Conclusion:

A. Socio-demographic Characteristics of the Study Population:

The study population was (150) cases ; (53.3%) males and (46.7%) females. This characterizes the Gazan community that has almost equal percentages of males and females. PCBS (2015) estimated that the population of GS totalled (1.82) million of which (925) thousand males and (895) thousand females (PCBS, 2015).

Fourty two percent of the study population's family consisted of (1-5) members, while (43.3 (%consisted of (6-10) members, (11.3%) of them consisted of (11-15) members, and (3.3%) consisted of (16-20) members. PCBS (2013) reported that the majority of Palestinian households have children (PCBS, 2013).

More than fourty five percent (45.3%) of the study population's families didn't have an income source, while about twenty nine percent (28.7(% of the families' heads were employed , (25.3%) of them were freelancers, and (0.7%) of them were owners. PCBS (2016) reported that the unemployment rate was about fourty percent in GS (PCBS, 2016).

In addition, (43.3%) of the surveyed children's family didn't get monthly salary, while (28%) of them got less than (500)NIS, fifteen percent (14.7%) got a salary between (500-1000)NIS, (13.3%) got a salary between (1000-3000)NIS, and just one of them (0.7%) got more than (5000)NIS. This indicates that, there was a considerable proportion of families in the GS who did not have adequate monthly income which reflected the state of poverty in the Palestinian community. Middle East Monitor (2016) reported that the Israeli siege imposed on the GS for a decade has damaged the enclave's economy (Middle East Monitor (MEM), 2016).

On the other hand, thirty eight percent of the surveyed children's families owned their homes, (9.3%) of them were rented apartment, while twenty five percent (24.7%) lived in apartment and (25.3%) of them lived in a home. This finding is consistent with GS situation characteristics, where people prefer to live in their owned houses and abstained from renting ones, unless they would not have any other choice (Kanoa et al., 2011).

Table 1 *Socio-demographic Characteristics of the Study Population*

Variable	No.	%
Gender		
Male	80	53.3
Female	70	46.7
Total	150	100.0
Age (Year)		
≥1-<2	70	46.7
≥2-<3	64	42.7
>3	16	10.6
Number of household		
1-5	63	42.0
6-10	65	43.3
11-15	17	11.3
16-20	5	3.3
Source of income		
Employee	43	28.7
Free profession	38	25.3
Owner	1	0.7
Unemployed	68	45.3
Relief receiver	0	0.0
Monthly income (NIS)		
No income	65	43.3
< 500	42	28.0
≥ 500 < 1000	22	14.7
≥ 1000 < 3000	20	13.3
≥ 5000	1	0.7
Home		
Owned	57	38.0
Rented	14	9.3
Flat	37	24.7
House	38	25.3
Missing	4	2.7

B. Vitamin A Status of the Study Population:

The currently recommended WHO cut-off point for judging that VAD in a community constitutes a public health problem and assessing its level of importance is a prevalence rate of (≥ 2 – <10%) for mild, (≥ 10-< 20%) for moderate and (≥ 20%) for severe levels of VAD. This is based on a serum retinol cut-off value of (<200)µg/L (MARAM, 2004). In the present study, (26%) of the study sample had VA levels below (300)µg/L. MARAM study (2004) conducted on (1.127) children in the WB and GS showed different result whereby (75.9%) of children had VA levels below (300)µg/L (MARAM, 2004). This difference might be due to different sample size.

Vitamin A Intervals (µg/L)	NO.	%
<200	8	5.3
200-299	31	20.7
≥300	111	74.0
Total	150	100

C. Socio-demographic and Serum Vitamin A Level of the Study Population:

In the present study, it was found that no statistical significance association between gender with serum VA level for the study population. This finding is consistent with the MARAM study which revealed that gender-specific VAD showed that VAD prevalence among male children was similar to that of female children with no significant difference between the two groups (MARAM, 2004).

It was also observed that there was an insignificance relationship between family's monthly income with serum of VA level for the study sample. This finding is inconsistent with MARAM study which showed that there were significant associations between VAD and the level of family income, where more than (90%) of the VA deficient children came from families with average incomes of (2000) NIS and less (MARAM, 2004).

On the other hand, it was found that an insignificance relationship between source of income, home and number of household the family's of malnourished children with VA serum level. Such unemployed due to Israeli siege on GS raised the level of poverty among Palestinians. It was known that (80%) of families in GS currently depend on humanitarian aids. This decline exposed unprecedented levels of poverty and the inability of a large majority of the population to afford basic food. As a result, food aid increased dramatically to meet the needs of this increasingly impoverished population (Kanoa, 2009).

Table 2 *Vitamin A Status of the Study Population*

Table 3 *Socio-demographic Characteristics and Serum Vitamin A Level of the Study Population*

Socio-demographic	Vitamin A Intervals (µg/L)	Total	P-value

Characteristics	Low <200	Borderline 200-299	Normal ≥300		
Gender					
Male	4 (5.0)	19 (23.8)	57 (71.3)	80 (100)	0.47
Female	4 (5.7)	11 (15.7)	55 (78.6)	70 (100)	
Total	8 (5.3)	30 (20.0)	112 (74.7)	150 (100)	
Number of Household					
1-5	3 (4.8)	12 (19.0)	48 (76.2)	63 (100)	0.76
6-10	4 (6.2)	13 (20.0)	48 (73.8)	65 (100)	
11-15	0 (0.0)	4 (23.5)	13 (76.5)	17 (100)	
16-20	1 (20.0)	1 (20.0)	3 (60.0)	5 (100)	
Total	8 (5.3)	30 (20.0)	112 (74.7)	150 (100)	
Source of Income					
Employee	4 (11.8)	6 (17.6)	33 (97.1)	43 (100)	0.33
Free Profession	1 (2.6)	8 (21.1)	29 (76.3)	38 (100)	
Owner	0 (0.0)	1 (100)	0 (0.0)	1 (100)	
Unemployed	3 (4.4)	15 (22.1)	50 (73.5)	68 (100)	
Total	8 (5.3)	30 (20.0)	112 (74.7)	150 (100)	
Monthly Income (NIS)					
No Income	3 (4.6)	14 (21.5)	48 (73.8)	65 (100)	0.55
<500	2 (4.8)	6 (14.3)	34 (81.0)	42 (100)	
500-999	1 (4.5)	6 (27.3)	15 (68.2)	22 (100)	
1000-2999	2 (10.0)	3 (15.0)	15 (75.0)	20 (100)	
>5000	0 (0.0)	1 (100)	0 (0.0)	1 (100)	
Total	8 (5.3)	30 (20.0)	112 (74.7)	150 (100)	
Home					
Owned	4 (6.9)	12 (20.7)	42 (72.4)	58 (100)	0.54
Rented	1 (5.9)	1 (5.9)	15 (88.2)	17 (100)	
Flat	2 (5.4)	6 (16.2)	29 (78.4)	37 (100)	
House	1 (2.6)	11 (28.9)	26 (68.4)	38 (100)	
Total	8 (5.3)	30 (20.0)	112 (74.7)	150 (100)	

D. Anthropometric Assessment Measurements and Serum Vitamin A Level of the Study Population:

The results of the current study found an insignificant association between each of stunting and wasting with serum of VA level. This finding is consistent with other study which showed that periodic vitamin A supplementation had no effect on the rate of weight or height gain in the total population or on the incidence of wasting, stunting, or wasting and stunting among children who were normally nourished at baseline (Fawzi et al., 1997).

Table 4 *Anthropometric Assessment Measurements and Serum Vitamin A Level of the Study Population.*

Anthropometric measurements	Vitamin A Intervals (µg/l) low <200	borderline 200-299	normal ≥300	total	p-value
Degree of W//A(SD)					
≥-1≤+1	0 (0.0)	0 (0.0	0 (0.0)	0 (0.0)	0.01*
≥-2≤ -1	1 (6.2)	7 (43.8)	8 (50.0)	16 (100)	
≥-3≤ -2	2 (2.2)	17 (18.2)	74 (79.6)	93 (100)	
< - 3	5 (12.2)	6 (14.6)	30 (73.2)	41 (100)	
Total	8 (5.3)	30 (20.0)	112 (74.7)	150 (100)	
Degree of L-H//A (SD)					
≥-1≤+1	1 (4.3)	5 (21.7)	17 (73.9)	23 (100)	0.73
≥-2≤ -1	1 (2.5)	10 (25.0)	29 (72.5)	40 (100)	
≥-3≤ -2	5 (8.2)	12 (19.7)	44 (72.1)	61 (100)	
< - 3	1 (3.8)	3 (11.5)	22 (84.6)	26 (100)	
Total	8 (5.3)	30 (20.0)	112 (74.7)	150 (100)	
Degree of W//L-H(SD)					
≥-1≤+1	1 (4.8)	3 (14.3)	17 (81.0)	21 (100)	0.52
≥-2≤ -1	2 (3.3)	13 (21.3)	46 (75.4)	61 (100)	
≥-3≤ -2	2 (4.2)	11 (22.9)	35 (72.9)	48 (100)	
< - 3	3 (15.0)	3 (15.0)	14 (70.0)	20 (100)	
Total	8 (5.3)	30 (20.0)	112 (74.7)	150 (100)	

*Statistically significant (p-value <0.05).

E. Neonatal History and Serum Vitamin A Level of the Study Population:

In the present study, it was found a statistical significant relationship between birth weight with serum VA level. This finding is inconsistent with the previous study which showed an insignificant association between child birth weight and serum VA and stated that VAD during pregnancy seemed to be associated with preterm birth, LBW and low neonatal liver stores (Al Shawwa, 2014).

In addition, the result showed that there was no significant association between neonatal jaundice with serum VA level. This finding is consistent with AlShawwa (2014) study which revealed an insignificant

association between neonatal jaundice and serum VA level (Al Shawwa, 2014).

The data analysis also revealed an insignificant association between admission to ICU with serum VA level. More than half (57.1%) of the children with normal serum VA level, entered to ICU.

Table 5 *Neonatal History and Serum Vitamin A Level of the Study Population*

Neonatal History	Vitamin A Intervals (µg/L) Low <200	Borderline 200-299	Normal ≥300	Total	P-value
Birth Weight (kg)					
< 2.5	3 (8.1)	7 (18.9)	27 (73.0)	37 (100)	0.05*
2.5-4	4 (3.6)	23 (20.7)	84 (75.7)	111 (100)	
> 4	1 (50)	0 (0)	1 (50)	2 (100)	
Total	8 (5.3)	30 (20.0)	112 (74.7)	150 (100)	
Admission to ICU					
Yes	1 (7.1)	5 (35.7)	8 (57.1)	14 (100)	0.26
No	7 (5.1)	25 (18.4)	104 (76.5)	136 (100)	
Total	8 (5.3)	30 (20.0)	112 (74.7)	150 (100)	
Neonatal Jaundice					
Yes	2 (4.1)	10 (20.4)	37 (75.5)	49 (100)	0.89
No	6 (5.9)	20 (19.8)	75 (74.3)	101 (100)	
Total	8 (5.3)	30 (20.0)	112 (74.7)	150 (100)	

F. Nutrition History and Serum Vitamin A Level of the Study Population:

In the present study, it was found that there was no association between immediate breastfeeding, exclusive breastfeeding and length of breastfeeding period with serum VA for malnourished children participants in the study. This finding is inconsistent with a study conducted in Bangladesh which reported that a (74 %) reduction in risk of VAD in breastfed children aged six months to three years as compared with non-breastfed children and even older children (24-35) months were (65%) less likely to be vitamin A deficient if they were breastfed (Rehydration Project, 2014).

In addition, it was found an insignificant association between age of introducing each of infant formula and complementary foods with serum VA. About (29%) and (26%) of malnourished children who received infant formula and complementary food between (6-12) months, respectively had serum VA below normal.

Table 6 *Nutrition History and Serum Vitamin A Level of the Study Population*

Nutrition History	Vitamin A Intervals (µg/L) Low <200	Borderline 200-299	Normal ≥300	Total	P-value
Immediate Breastfeeding					
Yes	7 (5.1)	28 (20.6)	101 (74.3)	136 (100)	0.82
No	1 (7.1)	2 (14.3)	11 (78.6)	14 (100)	
Exclusive Breastfeeding					
Yes	5 (4.7)	25 (23.4)	77 (72.0)	107 (100)	0.24
No	3 (7.0)	5 (11.6)	35 (81.4)	43 (100)	
Length of Breastfeeding Period (month)					
1-10	4 (5.1)	19 (24.1)	56 (70.9)	79 (100)	0.42
>10	4 (5.6)	11 (15.5)	56 (78.9)	71 (100)	
Age of Introducing Infant Formula (month)					
<6	5 (5.0)	20 (19.8)	76 (75.2)	101 (100)	0.78
6-12	3 (6.7)	10 (22.2)	32 (71.1)	45 (100)	
>12	0 (0.0)	0 (0.0)	4 (100.0)	4 (100)	
Age of Introducing Complementary Foods (month)					
<6	3 (8.8)	6 (17.6)	25 (73.5)	34 (100)	0.77
6-12	5 (4.4)	24 (21.1)	85 (74.6)	114 (100)	
>12	0 (0.0)	0 (0.0)	2 (100.0)	2 (100)	

G. Vitamin A and Some Micronutrients of the Study Population:

In the present study , it was found that there was no correlation between zinc level with serum VA for the study population. This result is inconsistent with the study that concluded supplementation with zinc improved indicators of VA status (Muñoz et al., 2000). While this result agrees with the study which revealed that there was no correlation between plasma levels of VA and zinc and suggested that in vitamin A-deficient children, without protein-energy malnutrition, zinc deficiency does not seem to have a role (Shingwekar et al., 1979).

Moreover, it was found a statistical significant correlation between level of iron with serum VA. This result is consistent with the previous study which revealed that a high VA intake was associated with a significantly lower mean hepatic iron level for the high dietary iron intake group (Staab et al., 1984). Moreover, iron-supplemented infants had significantly lower plasma retinol concentrations and a significantly higher prevalence of VAD, as defined by a plasma retinol concentration <0.70 micromol/L, than did the non-supplemented infants (Wieringa et al., 2003).

It was also observed that there was a statistical significant correlation was recorder between VA level and Hb. This finding is consistent with the previous

study showed that vitamin A deficient children were more likely to be anemic than children with normal levels of VA [2]. Other studies have found a significant correlation between serum retinol and hemoglobin concentration. Among Indian preschool children, hemoglobin values were found to be lower in those who had serum retinol below (20µg/dL) compared with those with normal levels (Reddy, 1998).

Table 7 *Vitamin A Serum Level and Some Micronutrients of the Study Population*

Micronutrients	NO.	R-value	P-value
Zinc (µg/dL) Mean ± SD Range	79.82±15.57 48-130	0.14	0.09
Iron (µg/dL) Mean ± SD Range	76.38±29.92 40-160	0.32	0.00*
Hb (g/dL) Mean ± SD Range	9.94±1.09 8-13.5	0.20	0.00*
Vitamin A(µg/L) Mean ± SD Range	395.98 ±126.60 162.71-861.00		

*Statistical Significant at P(<0.05).

H. Anemia and Vitamin A Serum Level of the Study Population:

It was also observed that there was no statistical significant relationship was recorder between anemia with serum VA level for the children participants in the study. This finding is inconsistent with the MARAM study which showed that thirty four percent of vitamin A deficient children aged (12-59) months were also anemic, indicating that vitamin A deficient children were more likely to be anemic than children with normal levels of VA (MARAM, 2004).

Table 8 *Anemia and Vitamin A Serum Level of the Study Population*

Hb Levels (g/dl)	Vitamin A Intervals (µg/L) Low <200	Borderline 200-299	Normal ≥300	Total	P-value
Anemic Hb<11	6 (4.9)	29 (23.6)	88 (71.5)	123 (100)	0.06
Normal Hb≥11	2 (7.4)	1 (3.7)	24 (88.9)	16 (100)	
Total	8 (5.3)	30 (20.0)	112 (74.7)	150 (100)	

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مستوى فيتامين (أ) لدى الأطفال تحت 5 سنوات المصابين بسوء التغذية ويترددون على جمعية أرض الإنسان في مدينة غزة

سوء تغذية الأطفال غالباً يبدأ عند الولادة ويترافق مع تراجع النمو البدني والمعرفي لهم. فيتامين (أ) هو فيتامين قابل للذوبان في الدهون ويعتبر من المغذيات الأساسية اللازمة للنظام البصري، والحفاظ على وظيفة الخلايا للنمو وسلامة النسيج الطلائي، إنتاج خلايا الدم الحمراء، المناعة والتكاثر. هدفت هذه الدراسة إلى فحص مستوى فيتامين (أ) لدى الأطفال المصابين بسوء التغذية الذين تقل أعمارهم عن 5 سنوات. تألّفت الدراسة من (150) طفلاً من كلا الجنسين. وتم استخدام استبيان مع أولياء الأمور, وإجراء القياسات الجسمانية. أخذت عينات دم لتحديد مصل فيتامين (أ), الزنك, الحديد وخضاب الدم. وإجراء التحليل الإحصائي باستخدام نسخة (18) من برنامج SPSS. تلقّى غالبية الأطفال (90.7٪) رضاعة طبيعية فورية، و(71.3٪) رضاعة طبيعية بحتة. ووجد عند نسبة (26٪) من الأطفال المشاركين مستوى فيتامين (أ) أقل من (300) ميكروغرام /ليتر. كما كان هناك علاقة إحصائية بين كل من نقص الوزن ووزن الولادة للأطفال مع مستوى فيتامين (أ). ووجد نسبة (82.7%) من الأطفال كان لديهم فقر دم, و(29%) من هؤلاء كان مستوى فيتامين (أ) لديهم أقل من الطبيعي. تؤسس هذه الدراسة قاعدة أساسية للمعلومات بشأن سوء التغذية بين الأطفال دون سن 5 سنوات في مدينة غزة. ويجب أن تكون التدخلات الرامية إلى تحسين الوضع الغذائي للأطفال موضع اهتمام.

كلمات مفتاحية:
مستوى فيتامين أ,
القياسات الجسمانية,
سوء التغذية,
الأطفال تحت سن الخامسة,
مدينة غزة.