# Correlation Between Nutritional Status and Immunity for Orphanage

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**Abstract:** The objectives of this study were to correlation between maturational status and immunity for children in orphan house and control sample. With this view in mind, orphan house namely Eleman, the total number of Eleman orphan house is 20 of which 10 males and 10 females, concerning the age of the investigated samples it was varied between 7 to 10 years old. On the other hand, the control sample has been taken from children out of the orphan house of different social levels; the total number of the control sample is 20 of which 10 males and 10 females. Concerning, the same age of the investigated samples. The 24- hour recall provides data for seven day of food intake by males and females groups of orphan house and control sample. The assessment included blood tests to study anemia and the immune system and its relation to nutritional status, capillary blood was collected from each child, This venous sample was used to obtain a complete hemogram (white and red blood cell counts, hemoglobin, Staf, Seg, Lym, Mono, Eos and Baso). The calories and major constituents, namely, carbohydrate; protein and fats scored lowest concentration to be correlated within the food intake by the males and females of control sample. With respect to trace elements and the mineral, control sample came in the first order due to the higher concentration of the following trace elements Fe and Zn as well as P, K and Na. Vitamin quantities showed similar trend. Results represent statistically significant difference between the males and females of orphan house and control sample in hemoglobin (HGB) and Red blood cell (RBC), data provide that the mean of HGB and RBC for the males and females of orphan house were faraway the minimum level of normal value of HGB and RBC, while the mean of HGB and RBC for the males and females of control sample were similar to the normal value of HGB and RBC. Such result indicated that individuals of the males and females group of Eleman orphan house were suffered from anemia. On the other hand, the males and females groups of control sample were not suffered from anemia. Result represent statistically significant between the males and females of orphan house and control sample in WBC, Staf, Seg, Lym, Mono, Eos, Baso result represent that the mean of WBC Staf, Seg, Lym, Mono, Eos and Baso for the males and females of orphan house were lower than the minimum level of normal value and lower than WBC, Staf, Seg, Lym, Mono, Eos and Baso of control sample, such results indicated that the males and females of orphan house had disturbance in there immune system.

**Key words:** Orphan house · Anemia · Immunity · Nutritional status

## INTRODUCTION

An orphanage is defined as "An Institution that houses children whose parents are deceased or whose whereabouts are unknown." It is a public institution created to provide care for protection for children without parents [1]. Although many people presume that most children who live in orphanages are orphans, this is often not the case with four out of five children in orphanages having at least one living parent and most having some extended family [2]. Most orphanages have been closed in the West. There remain a large number of state funded orphanages in the former Soviet Bloc but many of them are slowly being phased out in favour of direct support to vulnerable families and the development of foster care and adoption services where this is not possible. Most of the orphan house all over the world receives no governmental support; everything has been from donation from individuals and/or private organizations. Nutritional anemia result from the simple or combined deficiency of

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nutrients, such as iron, folic acid and vitamin B12. Other rare types of anemia can be caused by deficiency of pyridoxine, riboflavin and protein. Although various nutrients and cofactors are involved in maintaining the normal synthesis of hemoglobin, iron deficiency is the most frequent cause of anemia on a worldwide basis. This type of deficiency is the most widely spread, affecting especially children [3, 4]. The World Health Organization (WHO) defines nutritional anemia as a hemoglobin level below that which is considered normal for age, sex, physiological state and altitude, without considering the cause of the deficiency [5, 6, 7]. Without adequate nutrition, the immune system is clearly deprived of the components needed to generate an effective immune response. Human malnutrition is usually a complex syndrome of multiple nutrient deficiencies *studies confirmed that* confirmed the crucial role of several vitamins, minerals and trace elements in the maintenance of immune competence. This includes vitamin A, β-carotene, folic acid, vitamin B6, vitamin B12, vitamin C, vitamin E, riboflavin, iron, zinc and selenium [8, 9]. Antioxidant nutrients, for example, play a pivotal role in maintaining the antioxidant/oxidant balance in immune cells and in protecting them from oxidative stress and preserving their adequate function [10, 11].

To manage such problem and what to do at different ages of orphan individuals either males or females, writing an orphan houses plan is extremely helpful in that it helps the authorities to decide how they can face the problem, to proceed toward a social communication between the responded ministers and reassuring what to expect from private sectors. Such orphan plan presents a number of issues to create the country plan to think about and consider the problem of orphanages and how to locate them. It was very important to know more details about the real citations of orphan houses since the rule of government control would not be there

## MATERIALS AND METHODS

**Materials:** The problem at hand is dealing with the evaluation of nutritional statues of children's orphanage. With this view in mind, orphan house namely Eleman from Giza Governorate, Egypt and control sample.

**Orphan House:** It is clear from Table 1 that the total number of males in Eleman orphan house (10 cases) was the same number of the females (10 cases). Concerning the age of the investigated samples, it was varied between 7 to 10 years old. Eleman orphan house is located in Giza Governorate, Egypt.

Table 1: Distribution of individuals allocated in Orphan house and control sample

| Males/ Females | Orphan house | Control sample |
|---|---|---|
| Males | 10 | 10 |
| Females | 10 | 10 |
| Total | 20 | 20 |

**Control Sample:** The control sample has been taken from children out of the orphan house of different social levels. It is clear from Table 1 that the total number of the control sample is 20 of which 10 males and 10 females. Concerning the age of the investigated samples, it was varied between 7 to 10 years old.

**Methods:** Twenty Four (24) Hour Recall. The 24- hour recall provides data for seven day of food intake and is commonly used in nutrition surveys to evaluate the typical food intakes by individuals in any given orphan houses. The assessor inquiries from the tested individuals (males or females), to recount everything eaten or drink in the past 24 hours. It's useful to provide enough and accurate information to compare between orphan houses and individuals especially within their usual food intake. However, to obtain data about any given individual's usual intake. In addition, individuals were asked about the state of foods and the quantities consumed with (g. or Unit). After collecting the food intake data with a weak the average of the food intake per day, was calculated [12], were used to evaluate the intake meals.

**Blood Collection and Processing:** The assessment included blood tests to study anemia and the immune system and its relation to nutritional status and dietary habits. The assessment was conducted among 20 children from control sample (10 males and 10 females) and 20 children from orphan house (10 males and 10 females), capillary blood was collected from each child. This venous sample was used to obtain a complete hemogram (white blood cell and red blood cell counts, hemoglobin and lymphocyte counts) and percentage was obtained by using a Serono Baker 9000 hematology analyzer (Serono Baker Diagnostics, Allentown, PA). Studies have shown that the White blood cells play a vital role in the immune system. They are also known as leukocytes or sometimes WBCs by doctors.WBC circulate in the blood stream, attacking invading bacteria, parasites and any other cells and objects that are not meant to be floating around inside the blood. White blood cells are not all the same. In fact, there are six different types of white blood cells, each of which has a slightly different role to play in

the immune defense. The six types of WBCs (White blood cell) are split in to two major categories, granulocytes and agranulocytes [13]:

- Basophils (Baso)
- Neutrophils divided into: Segmented (seg) staf
- Eosinophils (Eos)
- Two kinds of granulocytes: Lymphocytes (Lym)-Monocytes (Mono) [14].

**Statistical Analysis:** Statistical analysis of the data in terms of analysis of variance, regression and multiregression analysis were performed according to using the "CSS" program (ANOVA) [15].

## RESULTS AND DISCUSSION

**Food Intake by Individuals of the Investigated Orphan House and Control Sample:** Foodstuffs intake by individuals of the investigated orphan house were collected through a time of one weak. These foods include 32 items some of which of cereal, vegetable, Fruit, meat origin beside dairy products. To evaluate the pattern of food intake, the following steps were considered. The actual amounts of foodstuffs consumed by males or females were calculated. Summation of the quantities intake per 7 days was considered to calculate food intake per day. Food intakes were concerned for the investigated orphan house namely Eleman orphan house. The aforementioned aspects were also considered for the males and females groups of the control samples.

The Mean of the Food Intake by the Males group of Orphan House and Control Sample Regarding the food intake by individuals of the males group of orphan house and control sample: the main following trends could be noticed (Table 2).

**Major Constituent:** The mean of the energy per day as Kcal obtained from the items of food intake by the males of orphan house reached 605.30 Kcal; which represents 30.26 % of 2000 Kcal of the RDA is given in Table 2. Subsequently, the energy requirements are out of the quantities required for physiological functions of male's individuals. To assure such trend; the energy intake by the males of the control sample was calculated to be 2164.18 Kcal as seen in Table 2. When carbohydrate level was considered, data of Table 2 proved a mean of 84.48 g per day for the males of orphan house. It could be also noticed that carbohydrates; are still the main sources of energy for the males of control sample when carbohydrate

level was considered, data in Table 2 proved a total of 223.46 g per day for the males of control. In case of the quantities of proteins (either plant or animal protein) intake by the males of orphan house, was found 25.52 g/day. The recommended daily allowance of protein was found to be 34 g per day and so, the intake of protein by the males group of orphan house was about 75.05% of protein requirements. The quantities of proteins intake by the males of control sample (either plant or animal protein) reached 73.64 g/day. So, the intake of protein by the males group of control sample was about 216.05 % of protein requirements of protein. In response to the mean amounts of fats which could be intake by the males of orphan house per day; it does not exceed 17.21 g per day. The total fat intake by the males group represents about 25.68 % of the RDA (67 g/day). Regarding the mean total amounts of fats intake by the males group of the control sample; it does not exceed 64.03 g per day, such level of fat of intake represents about 95.56 % of the RDA (67 g/day).

**Trace Elements:** Calculation of trace elements in terms of Fe, Zn within the food intake by the males of orphan house and control sample are given in Table 2, which the level of maintenance within the food intake by the males group of orphan house was noticed to be 5.43 mg/day for Fe. The recommended daily allowance of Fe was found to be 1o mg per day and so, the intake of Fe by the males group of orphan house was about 54.30% of Fe requirements. Levels of Zn showed in Table 2 that consumed by the males of orphanage were 3.06 mg/day, respectively; a trend which confirmed percentage of the RDA of about 30.60 %. Regarding calculation of trace elements in terms of Fe, Zn within the food intake by the males of control sample are given in the same table from which the corresponding recommended daily allowance was 10, 10 mg/day. The level of insurance within the food intake by control sample was noticed to be 131.90 % for Fe. On the other hand, level of Zn within the food intake by the males of control sample were 15.45 mg/day, respectively; a trend which assure a level percentage of about 30.60 % for Zn.

**Minerals:** The mineral contents were given as P, K, Na and Ca with a corresponding level of 403.31, 557.93, 1065.01 and 287.01 mg per day with the food intake by the males group of orphan house are shown in Table 3. These values represent 50.41, 27.89, 88.75 and 35.87 % of the RDA as seen in the Table 3. On the other hand, the mineral contents were given as P, K, Na and Ca with a

Table 2: Major chemical constituent, fat sources and Trace elements of the mean of the food intake by males and females groups collected from the investigated orphan houses and control sample

| Orphan houses & control sample | Calories (Kcal) | Major constituents (g) | | | Trace elements (mg) | |
|---|---|---|---|---|---|---|
| | | Carbohydrate | Protein | Fats | Fe | Zn |
| Orphan (males) | 605.3 | 84.48 | 25.52 | 17.21 | 5.43 | 3.06 |
| % | 30.26 | 26.23 | 75.05 | 25.68 | 54.30 | 30.60 |
| Orphan (females) | 874.24 | 91.97 | 27.94 | 22.07 | 5.36 | 2.92 |
| % | 34.13 | 28.56 | 82.17 | 32.94 | 53.60 | 29.20 |
| Control (males) | 2164.18 | 223.46 | 73.64 | 64.03 | 13.19 | 15.45 |
| % | 84.82 | 69.39 | 216.05 | 95.56 | 131.90 | 154.50 |
| Control (females) | 1860.84 | 200.18 | 66.05 | 57.79 | 11.14 | 8.4 |
| % | 75.85 | 62.16 | 194.26 | 86.25 | 111.4 | 84 |
| RDA | 2000 | 322 | 34 | 67 | 10.00 | 10.00 |

% = Calculated of the recommended daily allowance
RDA: Recommended Dietary Allowances (RDA). Jean [16].

Table 3: Minerals and vitamins of the mean of the food intake by Males and Females groups collected from the investigated orphan houses and control sample

| Orphan houses & control sample | Minerals (mg) | | Vitamins (mg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P | K | Na | Ca | A | B1 | B2 | B3 | B6 | B12 | C | E |
| Orphan (males) | 403.31 | 557.93 | 1065.01 | 287.01 | 1132.67 | 0.70 | 1.98 | 6.66 | 0.42 | 0.95 | 38.16 | 0.77 |
| % | 50.41 | 27.89 | 88.75 | 35.87 | 22.65 | 58.33 | 141.4 | 41.62 | 26.25 | 31.66 | 84.8 | 11.00 |
| Orphan (females) | 503.18 | 633.89 | 115.82 | 321.52 | 1091.06 | 0.76 | 1.84 | 6.92 | 0.39 | 0.92 | 34.32 | 1.03 |
| % | 62.89 | 31.69 | 9.65 | 40.19 | 21.68 | 57.50 | 131.4 | 43.25 | 24.37 | 30.66 | 76.26 | 14.71 |
| Control (males) | 1090.89 | 2365.23 | 2534.38 | 626.29 | 2700.61 | 1.53 | 3.88 | 18.03 | 1.66 | 3.44 | 98.10 | 5.18 |
| % | 136.36 | 118.26 | 211.19 | 78.28 | 54.01 | 127.50 | 277.1 | 112.68 | 103.8 | 114.66 | 218.00 | 74.00 |
| Control (females) | 957.49 | 2234.4 | 2317.01 | 622.63 | 8106.12 | 1.26 | 3.73 | 17.05 | 1.89 | 3.56 | 89.02 | 5.05 |
| % | 119.68 | 111.72 | 193.08 | 77.82 | 162.12 | 105.00 | 266.4 | 106.56 | 118.1 | 118.66 | 197.82 | 72.14 |
| RDA | 800.00 | 2000 | 1200 | 800.00 | 5000.00 | 1.20 | 1.4 | 16 | 1.60 | 3 | 45 | 7 |

% = Calculated of the recommended daily allowance

corresponding value of 1090.89, 2365.23, 2534.38 and 626.29 mg per day with the food intake by the males of control sample (Table 3). These values represent 136.36, 118.26, 211.19 and 78.28 % of the RDA as seen in Table 3.

**Vitamins:** To, the complete analyses of the food intake given in orphan house, concentration of vitamins A, B1, B2, B3, B6, B12, C and E were calculated within the food intake items and represented in Table 3. The concentration of vitamin A in terms of International Unit in the diets intake of the males of orphan house that was 1132.67 represents 22.65 % of the RDA. Regarding vitamins B1, B2 and B3 concentrations of the analyzed food intake by the males of orphanage based on food composition tables the available data proved that the obtained values were 0.70, 1.98 and 6.66 mg/day which equal to 58.33, 141.42 and 41.62%. The corresponding level for the later vitamins was 26.25% (B6), 31.66% ((B12), 84.8% (C) and 11% for (E) of the RDA. To assure, the complete analyses of the food intake given in control sample (males) (Table 3), concentration of vitamins A, B1, B2, B6, B12, C and E were calculated. Vitamin "A" content

in terms of international unit in the Diets intake of the males of the control sample that was 2700.61 represents 54.01% of the RDA of such vitamin. Regarding the concentration of vitamins B1, B2 and B3 which analyzed the food intake by the males of control sample based on food composition tables proved their values to be 1.53, 3.88 and 18.03 mg/day which equal to 127.50, 277.14 and 112.68 % of the RDA. The corresponding level for the later vitamins was 103.75 (B6), 114.66 ((B12), 218.00 (C) and 74.00 for (E)).

**The Mean of the Food Intake by the Females Group of Eleman Orphan House and Control Sample**
**Major Constituent:** The mean of the energy per day as Kcal from the items of food intake by the females reached 874.24 Kcal; while the RDA was 2000 Kcal as shown in Table 2. So, the energy requirements are not enough to acquire the need of physiological functions of female's individuals. To assure such trend; the energy intake by the females of the control sample was calculated to be 1860.84 Kcal as shown in Table 2. Data in Table 2 proved a total of 91.97 g carbohydrate per day for the females of

orphanage. When carbohydrate level was considered, a total of 200.18 g per day could be confirmed from the food intake by the females of control sample. On the other hand, proteins quantities (either plant or animal protein) does not exceed 27.94 g/day as seen from the same table, However, the recommended daily allowance of protein was found to be 34 g. So, the intake of protein represents about 82.17% of protein requirements. On the other hand, protein (either plant or animal protein) quantities intake by the females of control sample reached to 66.05 g/day as seen from the Table 2. However, the recommended daily allowance of protein was found to be 34 g/day and so, the intake protein reached up to 194.26 % of protein requirements. Regarding the total amounts of fats which could be intake by the female's orphanages; it does not exceed 22.07 g per day. So, the total fat which intake by the females group represents about 32.94 % of the RDA (67 g/day). On the other hand, the total amounts of fats which could be consumed by the females of the control sample; it does not exceed 57.79 g per day. However, the total fat which intake by the females group represents about 86.25 % of the RDA (67g/day).

**Trace Elements:** Fe, Zn levels in the food intake by the female of Eleman orphan house are shown in Table 2 beside the corresponding recommended daily allowance that was 10, 10 mg /day. The level of intake within the food consumed by the female of orphan house was noticed to be 53.60 % for Fe. Levels of Zn showed in the same table that consumed by the same female within the food intake of orphanage were 2.92 mg/day, respectively; a trend which confirmed percentage out of the RDA of about 29.20 %. Calculation of trace elements in terms of Fe, Zn within the food intake by the females of control sample is given in Table 2. It is clear that the corresponding recommended daily allowance was 10, 10 mg/day. The level of Fe intake within the food intake consumed by control sample reached 111.4%. Level of Zn in the food intake of the females of control sample was 8.4 mg/day, respectively; a trend which confirmed a level percentage of about 84 % for Zn.

**Minerals:** The mineral contents that given in Table 3 as P, K, Na and Ca were found to be with a corresponding value of 503.18, 633.18, 115.82 and 321.52 mg per day within the food intake by the females group of orphanage. These values represent 62.89, (63.38 –21.12), (19.30 – 6.43) and 40.19 % out of the RDA as seen in Table 3. On the

other hand, mineral contents given in the same Table; P, K, Na and Ca with a corresponding value of 957.49, 2234.4, 2317.01 and 622.63 mg per day within the food intake by the females group of control sample as shown in Table 3. These values represents 119.88, (223.44 –74.48), (536.16 –128.72) and 77.82 % out of the RDA as seen in the Table 3.

**Vitamins:** The complete analyses of the food intake given by orphan house was based on the analyses of vitamins A, B1, B2, B6, B12, C and E as shown in Table 3. The concentration of vitamin A in terms of international unit in the diets intake by the females group of orphanage was 1091.06 and represents 21.68% out 5000 I. U which is the RDA of such vitamin. From Table 3 the concentrations of vitamins B1, B2 and B3 indicated that their values were 0.76, 1.84 and 6.92 mg/day, respectively which equal to 57.50, 131.42 and 43.25 %of the RDA. The corresponding level for the other vitamins was 24.37 (B6), 30.66 ((B12), 76.26 (C) and 14.71 for (E).Analyses of the vitamins intake given for the control sample (females), include vitamins A, B1, B2, B6, B12, C and E are given in Table 3. The concentration of vitamin A in terms of international unit in the diets intake by the females of the control sample that was 8106.12 represents 162.12 % out 5000 I. U of the RDA. Regarding the concentrations of vitamins B1, B2 and B3 within the food intake by the control group values obtained that based on food composition tables proved to be 1.26, 3.73 and 17.05 mg/day which equal to 105.00, 266.42 and 106.56%. The corresponding level for the other vitamins was 118.12 (B6), 118.66 ((B12), 197.82 (C) and 72.14 for (E). The data are recorded in Tables 2 and 3 should the following trends:

- The calories and major constituents, namely, carbohydrates; protein and fats scored lowest concentration to be correlated within the food intake by the males and females of control sample as seen in Fig. 1.
- With respect to trace elements and the mineral contents within the food intake by individuals of the investigated orphan house and control sample, control sample came in the first order due to the higher concentration of the following trace elements; Fe and Zn as well as P, K and Na as seen in Tables 2 and 3 and Fig. 2 and 3.
- Vitamin quantities within the food intake showed similar trend as seen in Table 3 and Fig. 4 and 5.
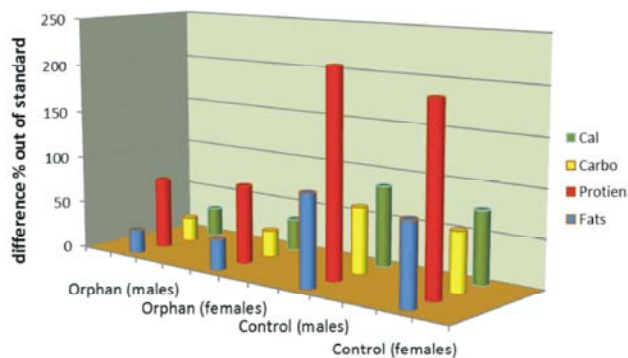
Fig. 1: Comparison between major chemical constituents of food intake by males and females groups of orphan house and control sample
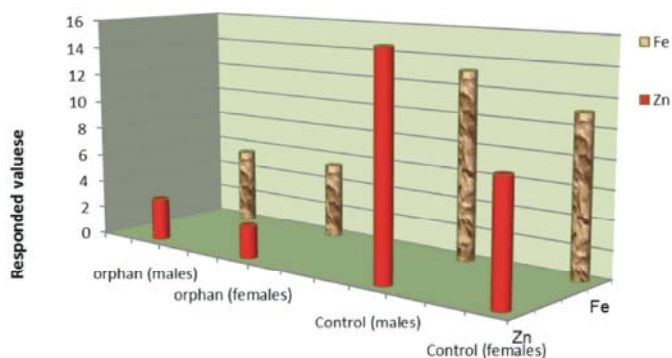


Fig. 2: Trace elements of food intake by males and females groups of orphan house and control sample
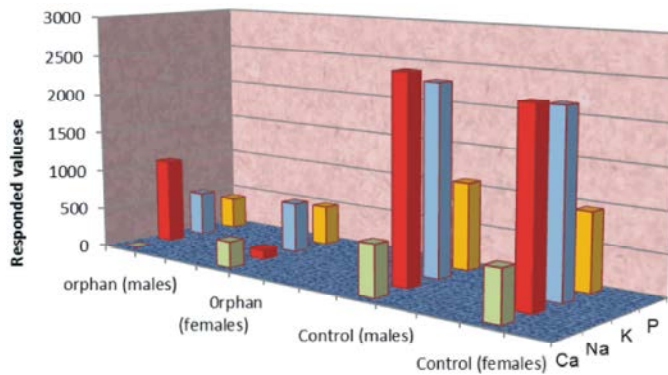


Fig. 3: Minerals of food intake by males and females groups of orphan house and control sample
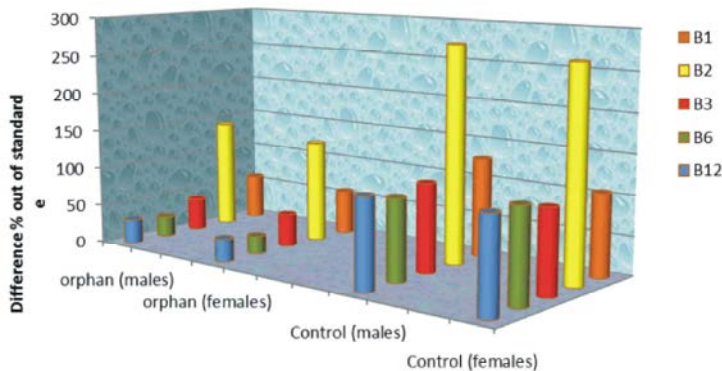


Fig. 4: Vitamin (B) concentration of the food intake by males and females groups of orphan house and control sample
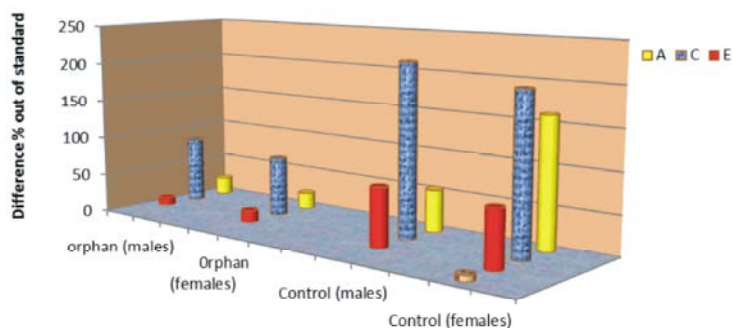
Fig. 5: Vitamin (A, C and E) concentration of the food intake by males and females groups of orphan house and control sample

Table 4: Comparison between male and females groups of orphan house and control sample in different blood components which were significant differences

|  | Males (Mean ± SD) | Females (Mean ± SD) | t | Sig. |
|---|---|---|---|---|
| White blood cell(WBC) Orphan house | 3,340.0±594.14 | 3,320.0±511.86 | 0.057 | - |
| WBC control sample | 8,380.0±438.18 | 8,260.0±634.82 | 0.348 | - |
| Staf Orphan house | 0.16±0.18 | 0.22±0.16 | 0.548 | - |
| Staf control sample | 1.66±0.13 | 1.62±0.31 | 0.264 | - |
| Segmented(Seg) Orphan house | 27.80±1.92 | 26.20±4.66 | 0.710 | - |
| Seg control sample | 54.40±4.28 | 54.20±4.87 | 0.069 | - |
| Lymphocytes (Lym) Orphan house | 15.20±1.30 | 14.00±1.00 | 1.633 | - |
| Lym control sample | 39.00±2.74 | 36.60±2.07 | 1.562 | - |
| Monocytes (Mono) Orphan house | 1.22±0.19 | 1.26±0.24 | 0.290 | - |
| Mono control sample | 7.40±0.55 | 7.50±0.71 | 0.250 | - |
| Eosinophils (Eos) Orphan house | 0.40±0.19 | 0.70±0.31 | 1.861 | - |
| Eos control sample | 3.00±0.71 | 3.40±0.55 | 1.000 | - |
| Baso Orphan house | 0.12±0.22 | 0.04±0.09 | 0.763 | - |
| Basophils (Baso) control sample | 1.50±0.31 | 1.80±0.23 | 1.732 | - |
| Hemoglobin (HGB) orphan house | 8.34±0.34 | 7.70±0.33 | 3.030 | * |
| HGB control sample | 12.82±0.68 | 12.22±0.45 | 1.640 | - |
| Red blood cell (RBC) orphan house | 2.66±0.36 | 2.72±0.40 | 0.247 | - |
| RBC control sample | 6.44±0.43 | 5.38±0.24 | 4.789 | * * |

**Blood Analysis for Individuals of the Investigated Orphan House and Control Sample:** One of the aim of the study is to shed light upon effect of nutritional status of orphans and control sample in different blood component such as Hemoglobin( HGB}, Red blood cell (RBC),White blood cell (WBC), Staf, Segmented (Seg), Lymphocytes (Lym), Monocytes (Mono), Eosinophils (Eos) and Basophils (Baso). Data in Table 4 represent there are no statistically significant difference between males and females groups of orphan house and control sample in HGB, RBC, BC, TAF, SLYM, MONO, EOS and BASO.

Data in Table 5 represent statistically significant difference between males group of orphan house and control sample in HGB, RBC, WBC, STAF, SLYM, MONO, EOS and BASO. Data in Table 5 proved that the mean of HGB for the males of orphan house were lower than the normal value of HGB, on the other hand the mean of HGB for the males of control sample were similar to the normal value of HGB. On the other hand, Data in Table 5

represent that the mean of RBC for the males of orphan house were faraway the minimum level of normal value of RBC, while the mean of RBC for the males of control sample were similar to the normal value of RBC. Data in Table 6 and Fig. 6 represent statistically significant between females of orphan house and control sample in HGB and RBC. Data of the table provide that the mean of HGB for the females of orphan house were lower than the normal value of HGB for the females, on the other hand the mean of HGB for the females of control sample were similar to the normal value of HGB. Data of the same table proved that the mean of RBC for the female of orphan house were faraway the mean of RBC for the females of control sample. Regarding the food intake by individuals of the males and females group of orphan house the mean of energy and protein intake by the males and the female of orphan house were faraway The recommended daily allowance of protein and energy as shown in Table 2 and Fig. 1. On the other hand, the food intake by the males

Table 5: Comparison between males groups of orphan house and control sample in different blood components which were significant differences

| Blood components | Orphan | Control | t | Sig. | Normal value |
|---|---|---|---|---|---|
| WBC | 3,340.0 ± 594.14 | 8,380.0 ± 438.18 | -15.266 | ** | (4000-10000) |
| Staf | 0.16 ± 0.18 | 1.66 ± 0.13 | -14.852 | ** | (0-00-2.00) |
| Seg | 27.80 ± 1.92 | 54.40 ± 4.28 | -12.681 | ** | (3500-75.00) |
| LYM | 15.20 ± 1.30 | 39.00 ± 2.74 | -17.546 | ** | (15.00-40.00) |
| MONO | 1.22 ± 0.19 | 7.40 ± 0.55 | -23.804 | ** | (2.00-9.00) |
| EOS | 0.40 ± 0.19 | 3.00 ± 0.71 | -7.948 | ** | (1.00-4.00) |
| BASO | 0.12 ± 0.22 | 1.50 ± 0.31 | -8.189 | ** | (0.00-2.00) |
| HGB house | 8.34 ± 0.34 | 12.82 ± 0.68 | -13.154 | ** | (12.00-16.00) |
| RBC house | 2.66 ± 0.36 | 6.44 ± 0.43 | -14.918 | ** | (5.20-7.20) |

and females group of control sample the total energy is not far away. The recommended daily allowance of energy and the intake of protein were over the level of recommended daily allowance of protein as shown in Table 2 and Fig. 1. Studies have shown that malnutrition children are often anemic [8, 9, 17, 18]. Such result indicated that individuals of the males and females group of orphan house were suffered from anemia, while the males and females group of control sample were not suffered from anemia.

Data in Tables 2 and 3 represents that the Fe, VC, VA, VB12 intake by the males and the females of orphan house were faraway the recommended daily allowance of Fe, VC, VA, VB12 as shown in Fig. 2, 4 and 5. Studies have shown that nutritional anemia result from the simple or combined deficiency of nutrients, such as iron and vitamin B12 [5, 6]. The absorption of iron is strongly influenced by various dietary components [19-22]. Data in Tables 2 and 3 represented that the males and females group of orphan house consume fewer iron-rich foods and vitamin C. The wide variety of factors that stimulate and inhibit iron absorption is well-known [20, 21]. Two powerful stimulators of iron absorption are meats and vitamin C. When ascorbic acid is added to the diet, there is a remarkable increase in iron absorption [23, 24] an intake of 10 to 20 mg of iron/day is necessary to meet the requirement of 1 mg of absorbable iron of children [24]. Studies have shown that there is a relationship between serum retinol and hemoglobin concentration, which indicates that vitamin A deficiency and anemia usually coexist. These studies also state that anemia could be a consequence of vitamin A deficiency [24, 25, 26]. It has been suggested that vitamin A influences iron metabolism; however, this mechanism has not been fully explained yet. It is unlikely that vitamin A could interfere directly with intestinal absorption of iron; it could however mobilize available iron stores and use the iron to form hemoglobin [24, 26, 27]. Another possibility is the reduction of transferrin level by vitamin A deficiency, which then reduces iron transportation [27]. Studies have

shown that the White blood cells play a vital role in the immune system. They are also known as leukocytes or sometimes WBCs by doctors. WBC circulate in the blood stream, attacking invading bacteria, parasites and any other cells and objects that are not meant to be floating around inside the blood. White blood cells are not all the same. In fact, there are six different types of white blood cells, each of which has a slightly different role to play in the immune defense. The six types of WBCs are split in to two major categories, granulocytes and agranulocytes (ibdcrohns.about.com/od/ dioynostictesting/ p/testwbc.htm). Three kinds of granulocytes:

- Basophils, neutrophils (seg– staf ), eosinophils
- Two kinds of agranulocytes
- Lymphocytes, monocytes [14].

Data in Table 5 and Fig. 7 provide that the mean of WBC, Seg, Mono and Eos for the males of orphan house were faraway the mean of WBC, Seg, Mono and Eos of the males of control sample. On the other hand, the mean of WBC, Seg, Mono and Eos for the males of orphan house were lower than the normal value of WBC, Seg, Mono and Eos as seen in Table 5. Data in Table 5 represent that the mean of staf, Lym and Baso of the males of orphan house were lower than the mean of staf, Lym and Baso of the control sample. On the other hand, data in Table 6 represents statistically significant difference between the females of orphan house and control sample in WBC, Staf, Seg, Lym, Mono, Eos and Baso. Data in Table 6 provide that the mean of WBC, Staf, Seg, Lym, Mono, Eos, Baso of females of orphan house were faraway the mean of WBC, Staf, Seg, Lym, Mono, Eos, Baso of control sample. Such results indicated that the males and females of orphan house had disturbance in there immune system. Studies have shown that without adequate nutrition, the immune system is clearly deprived of the components needed to generate an effective immune response. Human malnutrition is usually a complex syndrome of multiple nutrient deficiencies.

Table 6: Comparison between females groups of orphan house and control sample in different blood components which were significant differences.

| Blood components | Orphan | Control | t | Sig. | Normal value |
|---|---|---|---|---|---|
| WBC | 3,320.0 ± 511.86 | 8,260.0 ± 634.82 | -13.546 | * * | (4000-10000) |
| Staf | 0.22 ± 0.16 | 1.62 ± 0.31 | -8.890 | * * | (0-00-2.00) |
| Seg | 26.20 ± 4.66 | 54.20 ± 4.87 | -9.292 | * * | (3500-75.00) |
| LYM | 14.00 ± 1.00 | 36.60 ± 2.07 | -21.951 | * * | (15.00-40.00) |
| MONO | 1.26 ± 0.24 | 7.50 ± 0.71 | -18.679 | * * | (2.00-9.00) |
| EOS | 0.70 ± 0.31 | 3.40 ± 0.55 | -9.606 | * * | (1.00-4.00) |
| BASO | 0.04 ± 0.09 | 1.80 ± 0.23 | -15.679 | * * | (0.00-2.00) |
| HGB house | 7.70 ± 0.33 | 12.22 ± 0.45 | -18.094 | * * | (11.00-16.00) |
| RBC house | 2.72 ± 0.40 | 5.38 ± 0.24 | -12.710 | * * | (4.20-6.20) |
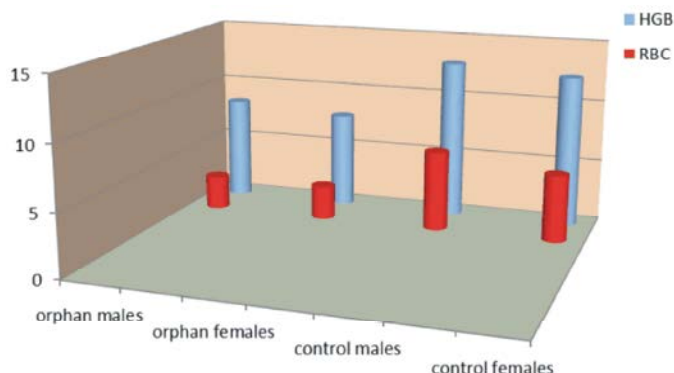


Fig. 6: Comparison between males and females groups of orphan house and control sample in HGB and RBC which were significant differences
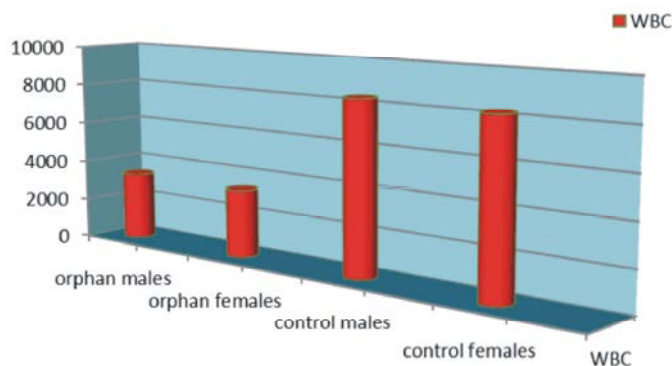


Fig. 7: Comparison between males and females groups of orphan house and control sample in WBC which were significant differences

Studies confirmed that confirmed the crucial role of several vitamins, minerals and trace elements in the maintenance of immune competence. This includes vitamin A, beta-carotene, folic acid, vitamin B6, vitamin B12, vitamin C, vitamin E, iron and zinc [10, 11].

Regarding the food intake by individuals of the males and females group of orphan house the total intake of vitamin A, B6, B12,C and E by the males and the females of orphan house were faraway The recommended daily allowance of vitamin A, B6, B12, C and vitamin E as shown in Table 3 and Fig. 4 and 5. On the other hand regarding, the food intake by the male and female group of control sample the total intake of vitamin A, B6, B12,C

and E were over the level of recommended daily allowance as shown in Table 3 and Fig. 4 and 5. Regarding the total intake of iron and zinc, by individuals of the males and females group of orphan house were faraway the recommended daily allowance as shown in Table 2. Data in Table 2 represent that the total intake of iron by the males and females group of control sample were over the level of recommended daily allowance of iron, On the other hand, the total intake of zinc by the males of control sample were over the recommended daily allowance of zinc, while the total intake of zinc by females of control sample were lower than the recommended daily allowance of zinc as shown in Table 2.

## CONCLUSION

In conclusion, it could be reported that the cal and major constituents, namely, carbohydrate; protein and fats scored lowest concentration to be correlated within the food intake by the males and females of control sample. With respect to trace elements and the mineral contents within the food intake by individuals of the investigated orphan house and control sample, control sample came in the first order due to the higher concentration of Fe. Vitamin quantities within the food intake showed similar trend. The aforementioned results were lustrated. In order to shed light upon the difference between the quantities of the food intake by orphans and control sample. The study represents statistically significant difference between males and females of orphan house and control sample in HGB and RBC. Data in Table 5 and 6 provide that the mean of HGB and RBC for the males and females of orphan house were faraway the minimum level of normal value of HGB and RBC, on the other hand the mean of HGB and RBC for males and females of control sample were similar to the normal value of HGB and RBC. Such result indicated that individuals of the males and females group of orphan house were suffered from anemia. This study represented that the mean of WBC, Staf, Seg, Lym, Mono, Eos and Baso for the males and females of orphan house were faraway the mean of WBC, Staf, Seg, Lym, Mono, Eos and Baso of the males and females of control sample. On the other hand, the mean of WBC, Seg, Mono and Eos for the males and females of orphan house were lower than the normal value of WBC, Seg, Mono and Eos. Such results indicated that the males and females of orphan house had disturbance in there immune system.

**Recommendations:**

- Nutrition specialist should be available to supervise the nutrition status in orphan houses.
- Direct supervision from the Ministry of Health to check children health care is highly required.
- Medical examination for the children should be regularly or at least twice per year.
- Resident Doctor in each orphan house.

## REFERENCES

1. Bicego, G., S. Rutstein and K. Johnson, 2003. Dimensions of the emerging orphan crisis in Sub-Saharan Africa. Social Science and Medicine, 56: 1235-1247.

2. Nyanbedha, E., S. Wandibbo and Aagaard-Hansenj, 2003. Changing patterns of orphan care cure to the HIV epidemic in western Keny. Social Science and Medicine, 57: 301-311.

3. White, K.C., 2005. Anemia is a poorpredictor of iron deficiency among toddlers in the United States: for heme the bell tolls. Pediatric, 115(2): 315-320.

4. Demaeyer, E. and M. Adiels-Tegman, 1985. The prevalence of anemia in the world. World Health Stat Q, 38: 302-16.

5. Ginebra, 1972. Série Informes Técnicos. Anemia nutricionales: informe de um grupo deexpertosen nutrition.

6. Osório, M.M., P.I.C. Lira and M. Batista-Filho, 2001. Prevalence of anemia Rev Panam Salud Publica/Pan Am. J. Public Health, 10(2): 101-7.

7. Romani, S.A.M., P.I.C. Lira, M. Batista Filho, L.A.S. Sequeira and C.L.C. Freitas,1991. Anemias em pré-escolares: diagnóstico, tratamento e avaliação, Recife-PE/Brazil. Arch. Latinoam Nutr.

8. Grimble, R.F., 1997. Effect of antioxidative vitamins on immune function with clinical applications. Int. J. Vit. Nutr. Res., 67: 312-320.

9. Chandra, R.K., 2002. Nutrition and the immune system from birth to old age. Eur. J. Clin. Nutr., 56: S73-S76.

10. Victor, V.M. and M. De L Fuente, 2002. N-acetylcysteine improves *in vitro* the function of macrophages from mice with endotoxin-induced oxidative stress. Free Rad. Res., 36: 33-45.

11. Calder, P.C. and S. Kew, 2002. The immune system: a target for functional foods? Br. J. Nutr., 88: S165-S177.

12. Food Composition Table, 1996. Academic of Scientific Research, Dept. of Food and Nutrition, Cairo, Egypt.

13. Kindt, T.J., B.A. Osborne and R.A. Goldsby, 2007. Overview of the Immune System. Kuby Immunology (6th Ed.).

14. Male, D., J. Brostoff, D.B. Roth and I. Roitt, 2006. Immunology. (7th Ed.). Philadelphia: Elsevier Limited. pp: 130-8.

15. Stat Soft Inc, 1991. Css Package: Complete Statistical System. Stat Soft Inc., Tulsa, Okla. V.S.A.

16. Jean, A.T., 1998. Food Values of portions Commonly Used, Philadelphia. New York.

17. Desai, N. and V.P. Choudhry, 1993. Nutrition anemia in protein energy malnutrition. Indian Pediatr., 30(12): 1471-83.

18. WHO, 1989. Demaeyer E. Preventing and controlling iron deficiency anemia trough primary health care. A guide for health administrators and programme managers.

19. Angelis, R.C. and M.L.B. Ctenas, 1993. Biodisponibilidade de ferrona alimentação infantil. Temas de Pediatria, pp: 52.

20. Hurrell, R.F., 1997. Bioavailability of iron. Eur. J. Clin. Nutr., 51: 54-8.

21. Stekel, A., M. Olivares, M.A. Pizarro, P. Chadud, M. Cayazzo, S. Llaguno, *et al.,* 1985. The role of ascorbic acid in the bioavailability of iron from infant foods. Int. J. Vitam. Nutr. Res., 27: 167-75.

22. FAO/WHO, 1988. Food and Nutrition Series, 23. Requirements of vitamin A, iron, folate and vitamin B12. Report of a Join FAO/ WHO Expert Consultation.

23. Lynch, S.R., 1997. Interaction of iron with other nutrients. Nutr. Rev., 55(4): 102-10.

24. Stekel, A., 1984. Iron Requirements in Infancy and Childhood. In: Stekel A, Editor. Iron Nutrition in Infancy and Childhood. Nestlé Nutrition Workshop Series, 4. New York: Nestlé, Raven Press, pp: 1-10

25. Hodges, R.R., H.E. Sauberlich, J.E. Canham, D.L. Wallace, R.B. Rucker, L.A. Mejia, *et al.*, 1978. Hematopoietic studies in vitamin A deficiency. Am. J. Clin. Nutr., 31: 876-885.

26. Bloem, M.W., 1995. Interdependence of vitamin A and iron: an important association for programmes of anemia control. Proc. Nutr. Soc., 54: 501-8.

27. Bloem, M.W., M. Wedel, R.J. Egger, A.J. Speek, J. Schrijver, S. Saowakontha *et al.*, 1989. Iron metabolism and vitamin A deficiency in children in Northeast Thailand. Am. J. Clin. Nutr., 50: 332-8.