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Assessment of Nutrition of Obese Primary Schools Children in Urban and Rural Area in El Bihera Governorate- Egypt.

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Abstract

Background: The prevalence of obesity is increasing in both developed and developing countries. Obesity is associated with increased risks of many diseases. Obesity significantly affects the quality of life and reduces the average life expectancy.

Objective: Investigate effect of different environment urban and rural areas in El Bihera governorate on blood glucose level and obesity of children aged 6-12 years to know possible associated risk factors.

Study design: This study of a representative sample of children 6-12 y of age performed during 1 July 2004 till 20 June 2005.

Methods: Anthropometric data were taken using standard methods, from 188 children. Certain diet and physical activities as well as other socioeconomic family parameters were assessed with the aid of a questionnaire. Obesity and overweight were defined using both the National Health and Nutrition Examination Survey (NHANES)I definition and the new International Obesity Task Force (IOTF) definition. Logistic regression analyses were performed to estimate the influence of various parameters.

Results: obesity was prevalent among girls13.8 and 11.7% than boys12.7 and 13.8% in urban and ruler areas respectively**.** The high percentage of boys and girls in both urban and rural (78.0% and 84.2% respectively and 83.3% and 89.8% respectively), who take snacks in between meals. Also the results show that about three-quarter of the urban boys (70.7%) and more than half of rural boys (65.8 %) eating during T.V watching. The results show that about two-third (58.3%) of the urban girls and about three-quarter (67.3%) of the rural girls eating during T.V watching with significant differences only among the urban groups (P 0.020). on the other hand, the plasma glucose values of all cases (normal and obese) in urban and rural areas were significantly different. In boys and girls subjects in rural and urban areas there were no significant differences between the mean values of plasma TSH. However, a significant difference between the plasma TC of urban areas than that of rural areas at the same age group was detected. There was a significant difference for the mean values of plasma TC level between normal and obese groups in the rural site.

Conclusion: The good news is that schools can help students and staff adopts healthy eating and physical activity behaviors that are the keys to preventing obesity.

Key words: Obesity – children – diabetes**.**

Introduction:

Obesity is often defined simply as a condition of abnormal or excessive fat accumulation in adipose tissue, to the extent that health may be impaired. However, the distribution of fat within the body and the associated health consequences vary between obese individuals **(WHO, 2000)**. Obesity is a major risk factor for chronic disease and plays a central role in insulin resistance **and** it is associated with decreased insulin sensitivity, and increased total cholesterol and triglycerides **(Lurbe, *et al.*, 2008).**

The rapidly increasing prevalence of obesity among children and adolescents is one of the most challenging dilemmas facing pediatric care professionals today. Childhood and adolescent obesity are important risk factors for adult obesity, with its consequent morbidity and mortality **(Whitaker, *et al.*, 1997**). Therefore, prevention and/or treatment of childhood and adolescent obesity offer the best hope of preventing adult obesity and its related morbidities.

The prevalence of obesity in children has increased significantly in developed countries but less rapidly, in developing ones **(Chinn and Rona, 2001)**. This trend is of major concern given the consequences that associated with childhood obesity. The percentage of children who are obese has more than doubled **(Ogden, *et al.*, 2008)**, and among adolescents the rates have more than tripled since 1980.

The ‘‘obesogenic’’ environment appears to be largely directed at the adolescent market, making healthy choices that much more difficult. At the same time, exercise patterns have changed and considerable parts of the day are spent sitting at school, in a work, or in front of a television or computer. Raised blood pressure, impaired glucose tolerance and dyslipidaemia are associated in adults children and adolescents with unhealthy lifestyles, such as diets containing excessive intakes of fats (especially saturated), cholesterol and salt, an inadequate intake of fiber and potassium, a lack of exercise, and increased television viewing Physical inactivity and smoking have been found independently top predict cardiovascular heart diseases (CHD) and stroke in later life. **(Aboderin, 2002)**

El Behaira governorate which was lies in the north of the Nile Delta and was the other representing governorate, 1477 school children in the age group 6-<12years in urban areas were examined. Prevalence of overweight and obesity among boys was 7.6% and 11.8% among in girls. It was much less in rural areas as among 3489 children only 3.8% and 3% boys and girls respectively were overweight and obese.

Patients and Methods:

From this sample examined those who accepted to be included in this study was 188 individuals, 101 of them were living in urban areas, 41 boys and 60 girls and 87 in rural areas, 38 boys and 49 girls. The sample included ninety apparently healthy children as a control, and ninety eight obese children in age groups from six years to twelve years. This study as a part from project was done by National Nutrition Institute called" obesity, its Relation to dietary pattern prevention and management."

1- Anthropometric Measurements:

Anthropometric Measurements namely weight and height percentage / age to indicator to nutritional status. The **subject** was weighed by standing bare footed on the center of the platform without touching or leaning on anything and with light clothing worn and determined and accordingly corrections were done **(WHO, 1995).** The subject was placed bare footed underneath the measuring arm, feet parallel and with heels, buttocks, shoulders and back of head touching the wall. The head was held comfortably erect and the outer border of the orbit with the external auditory meat us in the same horizontal plane (Frankfort Plane). The arms were hanging relaxed at the sides. The measuring arm was brought down on to the subject’s head with the back plate firmly against the wall. The red cursor line was giving the accurate height measurement **(WHO, 1995**). Duplicate observers for both weight and height were used.

2- Social Status Assessment

Assessment of social status of the family was done according to **(Park and Park, 1979)**. The method is based on the education and occupation of both father & mother. A score was given and the families were divided into three groups: low, middle or high social status.

3- Dietary Assessment:

Methods used for measuring food consumption of the surveyed families were classified into two major groups **(Gibson, 1998).** The first group, known as quantitative daily consumption method, consisted of recalls or records designed to measure the quantity of foods and beverages consumed over one day period "Twenty four-hour recall" method. The compiled food composition tables FCT of the Nutrition Institute were used to determine energy and nutrients intake of each individual. Adequacy of the diet consumed was assessed by comparing the energy and nutrient intake of the person with his recommended dietary allowances "RDA" **(WHO, 1985; WHO, 1998; WHO, 2000).** The second group of methods included the dietary pattern and food frequency questionnaire.

Dietary pattern "Food Frequency Questionnaire": This method was used to obtain qualitative descriptive information about usual food and beverage consumption pattern for the whole family per week (less than 3 times per week or equal or more than 3 times per week). **This questionnaire includes:**

- **Energy foods:** Cereals and its products – oils, fats – sugar and sweets
- **Tissue building foods:** Meat, chicken, fish, eggs, legumes, milk and its products
- **Protective foods:** Vegetables rich in carotene (high, moderate and low), fruits rich in calcium (high, moderate and low).
- **Beverages:** Tea, coffee, carcadeh, fenugreek, cocoa and fruit juice.

4- Biochemical Parameters Determination

Blood Samples: A venous blood sample of 5 ml was collected in heparinized tubes from 50% of total selected subjects. The rest of the blood was centrifuged to obtain the plasma first part of plasma was immediately determined glucose. The other part of plasma was divided into aliquots in five Ependorf vials and stored at – 20'c for the analysis. On each vial the ID and the name of the subject was recorded.

With the collected plasma, the following parameters were determined.

A - Determination of blood sugar: Enzymatic Colorimetric method of **(Trinder, 1969).**

B- Hormones:

- Thyroid stimulating hormone (TSH) was determined using kits according to (**Burger and Patel, 1977).**

C-Minerals: Zinc. Plasma zinc and **Chromium** concentration was determined by atomic spectrophotometer (UNICAM 929 atomic absorption spectrometer) after protein precipitation with trichloroacetic acid (50g/l) using the method of (**Thomerson & Price, 1971).**

D- **Lipid profile**

-Total cholesterol was determined by Stanbia cholesterol liquicolor kit, Quantitative Enzymatic–Colorimetric Determination according to (**Stein, 1986)**.

- **Triglycerides:** Serum triglycerides were determined according to the colorimetric method of **Fossati and Principe, (1982**) using the Biocon enzymatic kit.
- **Serum HDL-Cholesterol (HDL-C):** It was determined according to the method of **Gordon, *et al.* (1977)** using Biocon enzymatic kit.
- **Serum LDL-cholesterol (LDL-C):** was calculated by equation according to the **Friedwald, *et al.*, (1972)** equation:

Serum LDL-C concentration in (mg/dL) =

$$\text{Total cholesterol} - \left(\text{HDL-C} + \frac{\text{Triglycerides}}{5}\right)$$

5- Statistical analysis

The age (1 y interval for NHANES I definition and 6 month interval for IOTF definition) and sex-related prevalence of overweight and obese children were calculated using the previously mentioned cut-off points **(Guo, *et al.*, 1996).** Logistic regression analysis was used to estimate odds ratios (ORs) for obesity (as defined by the IOTF definition) in children. All ORs with a P-value less than 0.05 were

considered as statistically significant by (**spss, 1996**).

Results

From this sample examined, children who accepted to be included in this study was 188 individuals, 101 of them were living in urban areas and 87 in rural areas. The sample included from six years of age till twelve years. The number of primary school age children was 188, 47.9% of them were normal and 52.1 % were obese. Regarding sex, obesity was prevalent among girls13.8 and 11.7% than boys12.7 and 13.8% in urban and ruler areas respectively (**table 1).**

Social factors:

Socioeconomic status is usually presented as a composite index combining income education occupation and in some developing countries place of residence (urban or rural). Studies have reported that socioeconomic status is negatively correlated with obesity in developed countries but is positively related to obesity in developing countries **(Barlow and Dietz, 1998)**

Family size:

All the individuals were divided into three groups according to the size of the family

1) Less than 5 members 2) 5-9 members 3) more than 9 members

Among males most of them belonged to family size 5-9 in both urban and rural areas. The big family size was found only in rural areas. The same was observed among girls as shown in **table (2**).

Educational level:

Educational levels of the sample were divided into several groups:

1-Illiterate 2- read and write without school attendance 3-school attendance (primary, preparatory)

Family level table (2)

It was divided into three levels according to **Park and Park, 1977**:

1- High 2- intermediate 3- low

Very few cases belonged to the high family social level in both sites and gender. Among boys in the age group most of them belonged to the intermediate score in urban and to the low score in rural areas.

Regarding the relation between **family size** and obesity it was obvious that obese belonged to large families (5-9 persons) in both sites among boys and urban girls, while there was no difference among rural girls**.**

There was no relation between the **level of education** and obesity, while the role of **family score** played a more important role as obese belonged to middle and low social level rather than high family score**.**

Table (3) Assessment of Weight and Height Status: Weight status for children was assessed using NCHS reference standard and weight for height Z- scores. The following categories of weight status were determined: - Wasting <-2 SD. - Normal – 2 to + 2 SD. - Overweight > + 2 SD. For children weight and height were used to study weight status and classified to normal weight, and obese, according to **WHO, (1995)** based on weight and height (z-score). Table (3) showed that the mean weight measurements were significantly higher among obese individuals than those of normal weight with obese groups. There was no difference regarding the mean z-score among girls and also between urban and rural areas. Central obesity was observed to be more among boys than girls with no significant difference in both sites.

Tables (4) show the different opinions of the individuals regarding the main factors leading to obesity. In the age group, the diet was the main factor in both gender and sites. For individuals' opinion of food items related to obesity **table (5)** show that carbohydrate, sweets, fats food were the main items chosen by most obese in both sites.

Food intake

Dietary habits: While behavioral therapy has had some success in treating obesity in young children (aged 6-12 years), most studies have found that the long-term success of such therapy depends on the type of intervention used **(Epstein, *et al.*, 1990; Epstein, *et al.*, 1994; Somerbell, *et al.*, 2003 and Epstein, *et al.*, 2001).** It is possible that pharmacotherapy could play a significant role in improving the results obtained with behavioral therapy.

Tables (6 and 7) show distribution of the study groups (normal and obese) for primary school children (6-<12 years) according to dietary habits, dietary pattern and diversity, dietary adequacy and comparison with

population nutrient goals. Lunch was main meal among most of the urban and rural boys (87.8% and 87.5% respectively) without significant differences among groups in both urban and rural. Also the results show that about three-quarter of the urban boys (70.7%) and more than half of rural boys (65.8 %) eating during T.V watching. There was no significant difference among the two study groups in both urban and rural. The results revealed that more than half of both urban and rural boys (65.9% and 68.5% respectively), didn't consume fast foods without significant differences among study groups in both urban and rural. And girls, about two-third of the girls in both urban and rural (60.0% and 73.5 % respectively), take three meals per day. While only (26.7%) in urban and (16.3%) in rural take two meals per day. Few of them (10%) and (10.2) respectively, take more than three meals per day without significant differences among groups. Most of the girls in both urban and rural (81.7 % and 77.6 % respectively), said that lunch is the main meal. While a few of the urban girls (13.3%) said that the dinner is the main meal and a few of the rural girls (10.2%) said that breakfast is the main meals. The results showed that there were no significant differences among the study groups in both urban and rural. The majority of both the urban and rural girls (83.3% and 89.8% respectively), take snacks in between meals without significant differences among groups in both urban and rural. The results show that about two-third (58.3%) of the urban girls and about three-quarter (67.3%) of the rural girls eating during T.V watching with significant differences only among the urban groups (P≤ 0.020). Fast foods were consumed by only about one- third of both urban and rural girls (38.3% and 22.4% respectively), without significant differences among study groups in both urban and rural.

One-third of the urban girls (23.8%) brought beverages and chips from school. There was a significant difference only among the urban study groups (P≤ 0.051).

Tables (8) and (9) show mean intake ± S.D and adequacy diet of children with the study groups (normal and obese) regarding energy and macronutrients.

Energy: The mean RDA of energy was (2250 kcal). The lowest mean intake of energy was found among those of normal boys group in urban (2459.7 Kcal). There were significant differences among the normal and obese groups. In rural area the lowest mean intake ± S.D was among normal group (2531.4 Kcal). There were no significant differences among the two sites of obese groups. All boys got > 100 % of their RDA from energy .These results revealed that the more high intake of energy, the more prevalence of obesity.

For girls the total mean intake of energy was (2699.0) Kcal in urban while, it was (2700.0) Kcal in rural; the highest mean intake was found among those of obese girls in both urban and rural areas (3092.0 and 3072.0 Kcal respectively). The majority of girls got ≥ 100% of their RDA. There were no significant differences among the study groups.

Protein: In urban, all groups got > 100 % of their RDA from protein in two sites. There were no significant differences among the study groups in both urban and rural areas. **Girls** in urban the total mean intake was (99.6 g), the highest mean intake (108.2 g) was found among those of obese and the lowest mean intake (91.0 g) was found among those of normal weight. .While, in rural the total mean intake was (91.4 g) the highest and the lowest mean intake were (97.1 and 85.6 g) was found among those obese and normal girls respectively. Also the majority of girls were in both urban and rural got > 100% of their RDA from protein. There was no significant difference among two sites.

Fat: The lowest mean intake for boys in both urban and rural was observed among those of normal weight (90.1 g and 92.2 g respectively) without significant differences among the study groups. The total mean intake for girls was (98.6 and 82.4 g) in urban and rural respectively. The lowest mean intake was found among those of normal girls weight in urban and rural (72.1 and 71.8 g) respectively**.**

Carbohydrates: The results revealed that in urban those of obese weight consumed the highest mean intake of carbohydrates (438.6 g) also in rural the highest mean intake of carbohydrates (450.9 g) was observed among the obese boys. There was no significant difference among groups in two areas. The results represent that the total mean intake of

carbohydrate was higher in rural than urban (397.5 and 353.1 g) respectively. But the highest consumption was found among those of obese girls in both rural and urban (460.1 and 383.3 g) respectively.

Cholesterol: In both urban and rural areas the lowest consumption of cholesterol was observed among those of normal weight without significant differences among the studied groups. However, among the obese boys in urban area cholesterol intake was higher than (300 mg) which is the maximum level allowed as recommended by (**WHO, 2003).** The total mean intake of girls was higher in urban than rural (241.6 and 203.3 mg) respectively. The highest consumption of cholesterol was observed among those of obese girls (313.7 and 229.0 mg) in urban and rural.

Tables (10 &11): show that mean intake ± S.D and dietary adequacy of selected minerals (Calcium, Iron, Zinc, Copper and Selenium).

Calcium: There were significant differences in both urban and rural. The results show that the total mean intake in urban was (1247.8 mg); the lowest mean intake (1149.3 mg) was found among those of normal weight boys while, the highest mean intake (1346.3 mg) was found among obese boys. As for rural area the total mean intake was (853.7 mg) while, the lowest mean intake (833.0 mg) was belonging to those of normal weight and the highest mean intake (874.4 mg) belonging to those of obese boys. The results also show that the majority of boys in both urban got > 100 % of their RDA from Calcium. There were significant differences between the studied groups in both urban and rural. In urban the results show that the total mean intake was (1077.5 mg) while the highest mean intake (1111.4 mg) was belonged to those of normal weight and the low mean intake (1043.5 mg) was belonged to those of obese girls; while the total mean intake of Calcium in rural was (833.9 mg) and the highest mean intake (884.3 mg) was also belonging to those of normal weight but the low mean intake (783.5 mg) belonging to the obese group. The majority of the sample in urban area got > 100 % of their RDA from Calcium.

Iron: Also there were no significant differences among the levels of weight status in both urban and rural regarding mean intake and adequacy of diet. The total mean intake of Iron in both urban and rural was (28.0 and 26.1 mg respectively); but the highest mean intake was belonging to the obese boys in urban. The high percent of boys in levels of weight status in both urban and rural got >100% of their RDA. There was significant differences e in both urban and rural. Girls in urban; the results reflect the significant differences among those of normal weight in urban and ruler, regarding their mean intake of Iron (23.7, and 33.2 mg respectively). The highest mean intake (33.2 mg) was belonged to those of normal weight and the low mean intake (24.8 mg) was belonged to the obese group. At the same time the results show that urban and ruler girls got >100% of their RDA from Iron.

Zinc: There was no differences regarding mean intake and diet adequacy of Zinc among boys in both urban and rural as the total mean intake was (11.1 mg and 11.0 mg respectively). Also the high percent of boys got >100 % of their RDA. Also the results show that there was no significant difference in both urban and rural. The highest mean intake of Zinc (9.8 and 10.6 mg) in urban and rural respectively was belonged to the obese girls. Total girls in urban got 78.0 % of their RDA from Zinc while in ruler got 84.0% of their RDA without significant differences among study groups.

Copper: All boys in both urban and rural have got < 50% of their RDA. There was significant difference among obese status in both urban and rural regarding mean intake of Copper. The results reflect that the total mean intake of Copper was (0.07µg and 0.12 µg) in both urban and rural respectively with significant differences among the study groups. All the urban and rural girls got < 50% of their RDA from Copper.

Selenium: There were no significant differences in both urban and rural. The total mean intake was similar in urban and rural (37.6 mg and 36.9mg respectively). All boys got > 100% of their RDA. The highest mean intake (33.7 and 35.9 mg) was belonged to those of normal weight in the two areas. Total of the urban girls got 92.6 % from their RDA but in rural all girls got > 100 % of their RDA.

In tables (12) and (13): Show mean intake ± S.D and dietary adequacy of water

soluble vitamins. **Vitamins B1, B2, Niacin and Folic acid:** The results revealed that there was significant difference among total status in both urban and rural regarding mean intake and dietary adequacy from vitamins B1, B2, Niacin and Folic acid. A high proportion of boys have got > 100% of their RDA from the previous vitamins in both urban and rural except folic acid got 86.1%in urban and 68.4% in ruler area of their RDA. The results revealed that there were significant differences among total intake of vitamin B1, B2, Niacin and Folic acid in both urban and rural. The highest mean intake of vitamin B1, B2, Niacin and Folic acid in rural was belonged to those of normal girls weight (1.5, 2.3, 1.82, and 79.8 respectively). Also the results show that the total urban girls got > 100% of their RDA from B1, B2 and niacin respectively while got 65.0 % of their RDA from folic acid. In rural the girls got > 100% of their RDA from vitamins B1, B2, and Niacin respectively while they got 56.6 % of their RDA from folic acid. All the B vitamins, as well as lecithin, are essential for healthy weight loss.

Vitamin C: Also there were no significant differences among boys in the three study groups in both urban and rural regarding mean intake and dietary adequacy from vit. C. The total mean intake was(122.2 mg and 123.1 mg) in urban and rural respectively; the highest mean intake (135.2 mg) was belonging to those of normal weight in urban while, in rural the highest mean intake (145.6 mg) was found among those of obese. All boys were in urban and rural got > 100% of their RDA from vit. C. The results revealed that there were significant differences in both urban and rural regarding mean intake and dietary adequacy from vit. C. the lowest mean intake was belonged to those of normal weight in both urban and rural (106.7 and 114.6 mg respectively) while the highest mean intake was belonged to the obese girls (128.2 and 173.2mg) in both urban and rural respectively. All urban and rural girls got > 100% of their RDA.

Tables (14) and (15); show that mean intake ± S.D and dietary adequacy of fat soluble vitamins.

Vitamin "A": The total mean intake from vitamin A in urban and rural was (986.8 and 705.0 µg RE respectively); the highest mean intake (981.2 µg RE) belonged to obese boys in urban while, the highest mean intake in rural (773.9 µg RE) belonged to obese boys; with significant differences in both urban and rural.. In urban all boys got > 100% of their RDA without significant differences among the study groups, while, in rural total boys got 82.9 % of their RDA and also there was significant differences among the study groups in rural. The results revealed that in urban the highest mean intake (1058 RE) was belonged to those of normal girls weight while those of obese had the lowest mean intake (930.2 RE) . Urban girls got > 100% of their RDA. But in the rural those of normal weight got the lowest mean intake (668.3 RE) while the highest mean intake was belonged to the obese girls (763.9 RE). The total rural girls got 84.2 % of their RDA. There were significant differences among the study groups in both urban and rural.

Vitamin" E": The total mean intake of both urban and rural boys was (6.2 and 7.1 mg respectively); but the highest mean intake belonged to those of obese boys in rural (7.5 mg). Total boys in urban and rural area got 72.9 % of their RDA while, total boys in ruler got 83.5 % of their RDA. Also the results show that there were no significant differences among the study groups in both urban and rural. While in urban girls mean intake was as a similar value. The total mean intake of urban girls was (5.5 mg); while in rural the total mean intake was (7.3mg). Urban girls got 64.7 % of their RDA, while ruler girls got 85.9 of their RDA.

Table (16) show results of body composition fat analyzer according to sex, site and age group in El- Behaira governorate:

1-Basal Metabolic Rate (BMR) measured in (Kcal) increased with increase in weight status (normal= 1262.8 ± 114.17, & obese= 1502.3 ± 208.24 and P= 0.000).

BMR was higher in boys than girls (1509.6 ± 191.68 vs. 1291.0 ± 127.15, P= 0.000).

2-Fat Mass (FM) measured in (Kg) increased with increase in weight status

(normal= 11.6 ± 3.37, obese=20.7 ± 7.45, P= 0.000).

3-Fat Free Mass (FFM) measured in (Kg) was higher in boys than girls (31.9 ± 5.16 vs. 30.4 ± 5.05, P= 0.039).

4-Total Body Water (TBW) measured in (Kg) was higher in boys than girls (23.4 ± 3.78 vs. 22.3 ± 3.70, P= 0.038).

Biochemical analysis

Plasma Glucose: Data from table (17) showed that the plasma glucose level of both boys and girls subjects had significant difference (p< 005). On the other side, the plasma glucose value of all cases (normal and obese) in urban and rural areas was significantly different. There was no significant difference between the mean values of plasma glucose level in the normal and obese groups in urban site while in the rural site a significant difference was found between normal and obese group.

Lipids Profile: Results in table (17) showed that there was no significant difference between the mean values of plasma total cholesterol (TC), High density lipoproteins-cholesterol (HDL-C), Low density lipoproteins- cholesterol (LDL-C) and triglycerides (TG) between boys and girls subjects. However, a significant difference between the plasma TC of urban areas than that of rural areas at the same age group was detected. There was a significant difference between the mean values of plasma TC level between normal and obese groups in the rural site.

Plasma TSH, body weight is presented in tables (17) which illustrated that boys and girls subjects in rural and urban areas there were no significant differences between the mean values of plasma TSH. The highest prevalence of hyperthyroidism was among the boys in the age group (6-12 years).

Plasma Chromium: Results in table (17) indicated that plasma level of Chromium of boys and girls subjects in the age groups (6-12 years) showed no significant difference, While, a significant difference were detected between urban and rural areas. On the other hand, the lowest prevalence of Chromium deficiency (11.8%) was observed in girls in the age group (6-12 years).

Plasma Zinc: The results illustrated in tables (17) showed that there was no significant difference between sexes, sites and body weight status in the age groups. On the other hand, the lowest prevalence of zinc deficiency (5.9%) was observed in girls in the age group (6-12 years).

Discussion:

There was a clear underestimation of obesity using IOTF data (or overestimation using NHANES I data) in younger children, both data sets, that is NHANES I data and IOTF cut-offs, were used in this study; the World Health Organization's (WHO) current recommendations suggest the use of NHANES I data **(WHO, 1995). Tremblay and Willms,** (**2000)** who estimated prevalence of obesity in their study as defined by the NHANES I data was close to the observed prevalence of obesity in the United States. In Canada, the overall prevalence of obese boys was (13.5%) and girls (11.8%) 7-13 y, that the results were accepted with the present results in this study. The overall Prevalence of obesity in children in the U.S. was 17% in 2004 (**Ogden, *et al.*, 2006**), these results were agreed with the data in table (1).

Regarding to table (2) the sociodemographic characteristics of the subjects are shown in it. Many studies have shown a positive association between parental and childhood obesity (**Burke, *et al.*, 2001).** Various environmental factors have been implicated in the etiology of the increased prevalence of obesity, such as specific aspects of the home environment and family lifestyle, and sedentary activities and lack of physical activities (**Trost, *et al.*, 2001).** The environments in which people live are complex and their individual and combined elements have a marked effect on people's behaviors and dietary intakes. Individuals interact in a variety of micro environments or settings such as schools, workplaces, homes, restaurants and fast food outlets140. These in turn are influenced by the broader macro-environments or sectors such as the food industry **(Yanovsk and Sebring, 1994).**

Data in tables from 8 to 15 showed that mean intake ± S.D and adequacy diet of children with the study groups (normal and obese)

regarding energy, macronutrients and micronutrient.

Dietary factors that promote obesity include high-calorie beverages (sugared soft drinks or fruit juice), energy-dense foods (fast foods, snack foods), excess refined carbohydrates, excess dietary fat, and large portion sizes **(Trost, *et al.*, 2001).** The increase in the prevalence of obesity has coincided with an increase in portion sizes of foods both inside and outside the home, which suggests that larger portions may play a role in the obesity epidemic. Nutritional factors inherent in fast food, such as low levels of dietary fiber, high palatability, high energy density, high fat content, high glycaemic load, and high content of sugar in liquid form, may promote excess energy intake **(Astrup, 2001).** Dietary treatment plan and to provide adequate education, counseling by a health professional with expertise in dietary management is often required. Physicians usually do not have adequate time to devote to dietary management, and they may not have the expertise required. The use of a qualified and experienced health professional, preferably a registered dietitian, for dietary counseling and to implement an optimal dietary plan for achieving and maintaining a healthy body weight is recommended.

Diets with a strict limitation of energy intake leading to semi starvation should be strictly avoided because of serious health hazards that relate to deficiencies of several nutrients. Exaggerated lipid mobilization accompanied by an increased level of free fatty acids, together with a lack of essential amino acids and potassium and magnesium deficiencies might promote life-threatening cardiac arrhythmias (**Fisler, 1997**). The fundamental cause of obesity is greater imbalance between energy intake and expenditure than is expected for normal growth and development. Usually, this occurs over a period of time and in the setting of a susceptible genetic background and environmental factors (**Frontera, *et al.*, 2008**).

A low-energy diet recommended for the treatment of obesity should be low fat (<30%), high carbohydrate (~55% of daily energy intake), high protein (up to 25% of daily energy intake), and high fiber (25 g/day). A high-carbohydrate low-fat energy-deficient diet is usually recommended for weight management by medical societies and health authorities **(Hainer, *et al.*, 2004).**

Increased content of protein in a diet contributes to better weight loss maintenance because proteins are more satiating and thermogenic than carbohydrates and fats (**Westerterp-Planteng, *et al.*, 2004)** demonstrated that high protein intake sustained weight maintenance after very-low-calorie diet (VLCD)-induced weight loss. Studies made on the role of foods with a low glycaemic index and the role of increased calcium intake in reducing fat stores in human obesity have so far brought conflicting results (**Diaz, *et al.*, 2006; Thompson, *et al.*, 2005 and Zemel, 2004).**

It should be considered that the ratio between saturated, monounsaturated, and polyunsaturated fatty acids in ingested fats influences metabolic and cardiovascular risks of obesity including insulin resistance. In a recent statement, the American Diabetes Association recommends to limit an intake of saturated fats to < 7% of total calories and to minimize an intake of Trans fat.

Low-carbohydrate diets can be generally recommended to promote weight loss. No trials of low-carbohydrate diets have been performed that are powered for clinical end points (eg, myocardial infarction or death). It is therefore uncertain whether the beneficial effects of these diets on HDL-C and triglyceride levels out weigh the unfavorable changes in LDL-C level. In contrast, trials of reduced-fat diets, in conjunction with other lifestyle modifications such as increased physical activity, have demonstrated long-term maintenance of weight reduction and delayed onset of diabetes (**Knowler, *et al.*, 2002& Tuomilehto, *et al.*, 2001**) Furthermore, randomized controlled trials have also demonstrated the benefits of the Mediterranean diet on secondary prevention of cardiovascular disease **(Parikh, *et al.*,2005**). Several studies evaluated the role of low-carbohydrate diets in weight management (**Nordmann, *et al.*, 2006**). These diets have been advocated because they induce many favorable effects such as a rapid weight loss, a decrease of serum insulin and triglyceride levels, and a reduction of blood pressure as well as a higher suppression of appetite (partly due to ketogenesis, partly due

to a higher protein intake). However, several unfavorable effects of low-carbohydrate diet administration have been demonstrated, such as an increased loss of lean body mass, increased levels of LDL cholesterol and uric acid, and an increased urinary calcium excretion. An extremely low intake of carbohydrate may lead to an unwanted energetic efficiency

Vitamins, minerals, and trace elements are added to cover recommended daily allowances (**Gilden and Wadden, 2006**). Inadequate intake of this essential mineral can affect on over 200 enzymes in the body, such as, alkaline phosphates **(Reusser and McCarron, 1994).** Prospective studies of preschool-aged children confirmed that greater longitudinal intake of calcium was associated with lower body fat (Skinner et al., 2003).

B complex vitamins help produce energy and relieve stress and depression. Lecithin enables fats, such as cholesterol, to be liquefied and expelled from the body **(Reusser and McCarron, 1994).**

Researchers at the National Institute of Food and Nutrition in Warsaw studied 102 overweight women and found that the women had significantly lower levels of the antioxidant vitamins C and E, as well as of vitamin A, and a higher prevalence of overall vitamin deficiency than those of normal weight.

Insulin resistance represents a serious and common complication of obesity during childhood and adolescence **(Chiarelli and Marcovecchio, 2008**). Fasting glucose greater than 100 mg/dL is considered peripatetic, and a level greater than or equal to 126 mg/dL is consistent with the diagnosis of diabetes. The American Diabetes Association recommends a fasting plasma glucose measurement for children aged 10 years or older who have a BMI at or above the 85th percentile and 2 of the following risk factors: a family history of type 2 diabetes mellitus in first- or second-degree relatives, nonwhite race, and conditions associated with insulin resistance.

Fasting serum triglyceride levels are often elevated in obesity and are considered an early sign of metabolic syndrome. Children with total triglyceride levels greater than 200 mg/dL (to convert to mmol/L, multiply by 0.0113) should be followed up closely. Obese children should be referred to a gastroenterologist to be evaluated for nonalcoholic fatty liver disease and other chronic liver diseases (**VIBHA SINGHAL, *et al.*, 2007).**

This energetic efficiency is due to the suppression of the sympathetic nervous activity and to the development of low T_3 syndrome. Long-term studies are needed to evaluate the overall changes in nutritional status, body composition, metabolic health risks, and adverse events in response to low-carbohydrate diets. Without that evaluation, low-carbohydrate diets cannot be recommended (**Astrup, *et al.*, 2004).**

Chromium is an essential mineral to maintain good health. The metabolism of lipids and glucose is dependent on chromium, which helps the body maintain healthy energy levels **(Cefalu, *et al.*, 2002).** Chromium is a potent metabolic hormone that aids in the breakdown and distribution of protein and carbohydrates so the body can use those fuels efficiently. Weight loss is promoted when chromium is taken. Chromium supports normal thyroid hormone, which regulates the body's ability to burn calories. It also alters the metabolism of serotonin, a neurotransmitter that controls the appetite and curbs cravings for sugar. Chromium works best if taken before meals to help maintain normal blood sugar level (**Anderson, 2000).**

Zinc deficiency can directly affect cognitive and perceptual processes that help maintain these insidious eating disorders. Recently it has been shown that there is an inverse relationship between morbid obesity and zinc, meaning that the more morbidly obese the individual the lower their zinc status. This suggests that zinc plays an important role in the entire continuum of eating disorders, from obesity to anorexia nervosa **(Reusser and McCarron, 1994).**

Conclusion:

Obesity treatment should be individually tailored and the age, sex, degree of obesity, individual health risks, metabolic and psychobehavioral characteristics, and outcome of previous weight loss attempts should be taken into account. In the future, hormonal and hereditary factors affecting weight loss should also be considered.

The good news is that schools can help students and staff adopts healthy eating and physical activity behaviors that are the keys to preventing obesity.

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Table (1) Percent distribution of Individuals according to sex, age groups, weight and sites in EL Behaira governorates.

Age groups	Site	Gender	Normal		Obese		Total
			No	%	No	%	
6->12	U	B	17	33.3	24	48.0	41
		G	34	66.7	26	52.0	60
		T	51	100	50	100	101
	R	B	12	30.8	26	54.2	38
		G	27	69.2	22	45.8	49
		T	39	100	48	100	87
Total			90	100	98	100	188

B=Boys G= girls T=total U= urban R= rule

Table (2): Biodemographic status of children in EL Behaira governorates.

Age sex	Family Score	Urban						Rural					
		Normal		Obese		Total		Normal		Obese		Total	
		No	%	No	%	No	%	No	%	No	%	No	%
6-<12 girls	High	0	0.0	0	0.0	0	0	0	0.0	0	0.0	0	0
	Moderate	17	28.3	16	26.7	33	55.0	6	12.2	11	22.4	17	34.7
	Low	17	28.3	10	16.7	27	45.0	21	42.9	11	22.4	32	65.3
	Total	34	56.7	26	43.3	60	100	27	55.1	22	44.8	49	100
6-<12 boys	High	0	0.0	1	1.6	1	1.6	0	0.0	0	0.0	0	0
	Moderate	12	29.3	17	41.5	29	70.7	5	13.2	7	18.4	12	31.6
	Low	5	12.2	6	14.6	12	29.3	7	18.4	19	50.0	26	6804
	Total	17	41.5	24	58.5	41	100	12	31.6	26	68.4	38	100
	Family Size	No	%	No	%	No	%	No	%	No	%	No	%
6-<12 girls	<5	17	28.3	11	18.3	28	46.7	2	4.1	6	12.2	8	16.3
	5-9	17	28.3	14	23.3	31	51.7	25	51.0	16	32.7	41	83.7
	>9	0	0.0	1	1.6	1	1.6	0	0.0	0	0.0	0	0.0
	Total	34	56.7	26	43.3	60	100	27	55.1	22	44.8	49	100
6-<12 boys	<5	6	14.6	8	19.5	14	34.1	11	28.9	11	28.9	22	57.9
	5-9	11	26.8	16	39.0	27	65.9	1	28.9	14	36.8	15	39.5
	>9	0	0.0	0	0.0	0	0.0	0	0.0	1	2.6	1	2.6
	Total	17	41.5	24	58.5	41	100	12	31.6	26	68.4	38	100
	Education level	No	%	No	%	No	%	No	%	No	%	No	%

6-<12 girls	Illiterate	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Can read and write only	33	55.0	27	45.0	60	100	27	55.1	22	44.9	49	100
	Total	33	55.0	27	45.0	60	100	27	55.1	22	44.9	49	100
6-<12 boys	Illiterate	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Can read and write only	17	41.5	24	58.5	41	100	15	39.5	23	60.5	38	100
	Total	17	41.5	24	58.5	41	100	15	39.5	23	60.5	38	100

Table (3): The mean anthropometric measures in children according to age groups and sites in EL Behaira governorate.

Age and six	Anthropometric measurements	Urban		Rural	
		Normal	Obese	Normal	Obese
		mean± S.D	mean± S.D	mean± S.D	mean± S.D
boys 6-<12	Weight	41.28± 6.05	50.52± 7.17	39.71± 6.61	52.57± 6.89
	Height	137.4± 8.16	136.8± 8.37	136.1± 8.86	138.4± 13.21
	Weight/ height Z. score	1.27± 0.4	4.35± 0.83	1.01± 0.6	4.35± 0.59
girls 6-<12	Weight	41.31± 7.09	53.37± 12.10	43.11± 5.88	48.24± 9.96
	Height	137.8± 9.89	138.3± 11.03	138.8± 7.09	131.7± 11.13
	Weight/ height Z. score	1.28± 0.54	3.7± 0.6	1.18± 0.6	4.1± 0.8

Table (4) Percent of distribution of the individual opinion about the main factor related to obesity according to site and age for children in EL Behaira governorates

Age	Factors	Urban						Rural					
		Normal		Obese		Total		Normal		Obese		Total	
		No	%	No	%	No	%	No	%	No	%	No	%
boys 6-<12	Diet	16	39.0	21	51.2	37	90.2	11	28.9	22	57.9	33	86.8
	Drugs	0	0.0	0	0.0	0	0	0	0.0	0	0.0	0	0
	Low physical activity	2	4.9	2	4.9	4	9.8	2	5.2	3	7.9	5	13.2
	Total	18	43.9	23	56.1	41	100	13	34.2	25	65.8	38	100
Girls 6-<12	Diet	26	43.3	22	36.7	48	80.0	22	44.9	17	34.7	39	79.6
	Drugs	0	0.0	0	0.0	0	0	0	0.0	0	0.0	0	0
	Low physical activity	6	10.0	6	10.0	12	20.0	7	14.3	3	6.1	10	20.4
	Total	32	53.3	28	46.7	60	100	29	59.2	20	40.8	49	100

Table (5) Percent of distribution of individual's opinions of diets related to obesity according to age and body weight by site of children in EL Behaira governorates.

Age	Family history of certain disease	Urban						Rural					
		Normal		Obese		Total		Normal		Obese		Total	
		No	%	No	%	No	%	No	%	No	%	No	%
boys 6<12	Carbohydrates	1	2.4	7	17.1	8	19.5	6	15.8	11	28.9	17	44.7
	Sweets	3	7.3	10	24.4	13	31.7	2	5.3	7	18.4	9	23.7
	Fats	3	7.3	0	0.0	3	7.3	1	2.6	3	7.9	4	10.5
	Fast food	1	2.4	0	0.0	1	2.4	0	0.0	0	0.0	0	0.0
	Soft drinks	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Nuts	5	12.2	0	0.0	5	12.2	0	0.0	0	0.0	0	0.0
	Fruit vegetables	0	0. 0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	proteins	0	0.0	3	7.3	3	7.3	2	5.3	0	0.0	0	0.0
	Juices	2	4.9	0	0.0	2	4.9	1	2.6	0	0.0	0	0.0
	food between meals	0	0.0	6	14.6	6	14.6	0	0.0	5	13.2	5	13.2
	Total	15	36.6	26	63.4	41	100	12	31.6	26	68.4	38	100
girls 6<12	Carbohydrates	4	6.7	7	11.7	11	18.3	11	22.4	6	12.2	17	34.7
	Sweets	14	23.3	11	18.3	25	41.7	7	14.3	7	14.3	14	28.6
	Fats	8	13.3	4	6.7	12	20.0	5	10.2	3	6.1	8	16.3
	Fast food	1	1.7	1	1.7	2	3.3	0	0.0	0	0.0	0	0.0
	Soft drinks	1	1.7	0	0.0	1	1.7	0	0.0	0	0.0	0	0.0
	Nuts	1	1.7	0	0.0	1	1.7	0	0.0	0	0.0	0	0.0
	Fruit vegetables	0	0.0	0	0.0	0	0.0	2	4.1	1	2.0	3	6.1
	proteins	4	6.7	2	3.3	6	10.0	1	2.0	5	10.2	6	12.2
	Juices	1	1.7	0	0.0	1	1.7	1	2.0	0	0.0	1	2.0
	food between meals	0	0.0	1	1.7	1	1.7	0	0.0	0	0.0	0	0.0
	Total	34		26		60	100	27	55.1	22	44.9	49	100

Table (6) Distribution of boys 6-12 y according to dietary habits in total sample in Behaira governorate

Dietary habits	urban				Total		rural				Total	
	Normal		Obese				Normal		Obese			
	No	%	No	%	No	%	No	%	No	%	No	%
No of meals												
1	1	2.4	-	-	1	2.4	-	-	-	-	-	-
2	7	17.1	7	17.1	14	34.1	3	7.9	7	18.4	10	26.3
3	4	9.8	16	39.0	20	48.9	9	23.7	18	47.4	27	71.1
>3	5	12.2	1	2.4	6	14.6	-	-	1	2.6	1	2.6
Total	17	41.5	24	58.5	41	100	12	31.6	26	68.4	38	100
Main meals												
Breakfast	1	2.4	1	2.4	2	4.9	-	-	1	2.6	1	2.6
Lunch	14	34.1	22	53.7	36	87.8	11	28.9	23	60.5	34	89.5
dinner	2	4.9	1	2.4	3	7.3	1	2.6	2	5.3	3	7.9
Total	17	41.5	24	58.5	41	100	12	31.6	26	68.4	38	100
Snacks in between meals												
Yes	13	31.7	19	46.3	32	78.0	10	26.3	22	57.9	32	84.2
No	4	9.8	5	12.2	9	22.0	2	5.3	4	10.5	6	15.8
Total	17	41.5	24	58.5	41	100	12	31.6	26	68.4	38	100
Eating during T.V. watching												
Yes	12	29.3	17	41.5	29	70.7	9	23.7	16	42.1	25	65.8
No	5	12.2	7	17.1	12	29.3	3	7.9	10	26.3	13	34.2
Total	17	41.5	24	58.5	41	100	12	31.6	26	68.4	38	100
Consuming fast food												
Yes	7	17.1	7	17.1	14	34.1	3	7.9	9	23.7	12	31.5
No	10	24.4	17	41.5	27	65.9	9	23.9	17	44.7	26	68.5
Total	17	41.5	24	58.5	41	100	12	31.6	26	68.4	38	100
Type of food buy at school	4 boys		10 boys		14	100	6 boys		8 boys		14	100
Beverage	-	-	1	10	1	7.1	2	33.3	-	-	2	14.3
Chips	1	25	2	20	3	21.4	1	16.7	2	25	1	7.1
Koshari	-	-	-	-	-	-	-	-	1	12.5	1	7.1
Molto	1	25	-	-	1	7.1	-	-	-	-	-	-
Pizza	-	-	-	-	-	-	-	-	2	25	2	14.3
Buiscite	-	-	6	60	6	42.9	2	33.3	1	12.5	3	21.4
Homos	-	-	-	-	-	-	-	-	-	-	-	-
Termis	-	-	-	-	-	-	-	-	-	-	-	-
Nuts	-	-	1	10	1	7.1	-	-	2	25	2	14.3
chocolate	2	50	-	-	2	14.3	1	16.7	-	-	1	7.1

Table (7) Distribution of girls 6-12 y according to dietary habits in total sample in El Behaira governorate.

Dietary habits	urban						rural					
	Normal		Obese		Total		Normal		Obese		Total	
	No	%	No	%	No	%	No	%	No	%	No	%
No of meals												
1	1	1.7	1	1.7	2	3.3	-	-	-	-	-	-
2	9	15.0	7	27	16	26.7	5	18.5	3	13.6	8	16.3
3	21	35.0	15	57.7	36	60.0	20	74.1	16	72.7	36	73.5
>3	3	5.0	3	11.5	6	10.0	2	7.4	3	13.6	5	10.2
Total	34	56.7	26	43.3	60	100	27	55.1	22	44.9	49	100
Main meals												
Breakfast	2	3.3	1	1.7	3	5.0	3	11.1	2	9.1	5	10.2
Lunch	28	46.7	21	35.0	49	81.7	21	77.8	17	77.3	38	77.6
dinner	4	6.7	4	6.7	8	13.3	3	11.1	3	13.6	6	12.2
Total	34	56.7	26	43.3	60	100	27	55.1	22	44.9	49	100
Snacks in between meals												
Yes	29	85.3	21	80.8	50	83.3	25	92.6	19	86.4	44	89.8
No	5	14.7	5	19.2	10	16.7	2	7.4	3	13.6	5	10.2
Total	34	56.7	26	43.3	60	100	27	55.1	22	44.9	49	100
Eating during T.V. watching												
Yes	23	67.6	12	46.2	35	58.3	18	66.7	15	68.2	33	67.3
No	11	32.4	14	53.8	25	41.7	9	33.3	7	31.8	16	32.7
Total	34	56.7	26	43.3	60	100	27	55.1	22	44.9	49	100
Consuming fast food												
Yes	12	35.3	11	42.3	23	38.3	7	25.9	4	18.2	11	22.4
No	22	64.7	15	57.7	37	61.7	20		18		38	77.6
Total	34	56.7	26	43.3	60	100	27	55.1	22	44.9	49	100
Type of food buy at school	7 girls		15 girls		21	100	11 girls		12 girls		23	100
Beverage	4	57.1	1	12.5	5	23.8	1	9.1	3	25	4	17.4
Chips	-	-	5	62.5	5	23.8	3	27.2	2	16.7	5	21.7
Koshari	-	-	1	12.5	1	4.8	1	9.1	1	8.3	2	8.7
Molto	-	-	-	-	-	-	1	9.1	1	8.3	2	8.7
Pizza	1	14.3	-	-	1	4.8	1	9.1	-	-	1	4.3
Buiscite	2	28.6	1	12.5	3	14.3	2	18.2	5	41.7	7	30.4
Homos	-	-	-	-	-	-	-	-	-	-	-	-
Termis	-	-	-	-	-	-	-	-	-	-	-	-
Nuts	-	-	-	-	-	-	2	18.2	-	-	2	8.7
chocolate	-	-	-	-	-	-	-	-	-	-	-	-

Table (8) Mean Energy and selected macronutrients intake ± SD per day among Boys 6-<12 years in the different study groups in EL Behaira governorates

Variables	Urban			Rural		
	Normal (17)	Obese (24)	Total (41)	Normal (12)	Obese (26)	Total (38)
	mean± SD	mean± SD	mean± SD	mean± SD	mean± SD	mean± SD
Energy (Kcal) intake	2460 ± 325.0	3350.0± 441.2	2905± 383	2531± 330.4	3361± 441.0	2946± 385.5
Mean RDA (Kcal)	2250	2250	2250	2250	2250	2250
% intake from RDA	109.3%	148.9%	129.1%	112.5%	149.4%	131%
Total protein (g) intake	93.7± 14.6	123.9± 25.0	108.8± 19.1	99.6± 8.4	110.4± 20.1	105.0± 14.0
RDA for protein /g	36.5	36.5	36.5	36.5	36.5	36.5
% intake from RDA	256.7%	339.5%	298.1%	272.9%	302.5%	287.7%
Total fat (g) intake	90.1± 11.5	122.3± 23.0	106.2± 17.2	92.2± 12.5	124.0± 14.1	108.1± 21.3
Cholesterol (mg) intake	200.3± 17.7	363.3± 29.5	281.8± 20.2	201.9± 16.7	297.1± 20.6	249.5± 18.0
Carbohydrates (g) intake	318.5± 27.7	438.6± 16.4	378.5± 14.1	326.1± 13.6	450.9± 18.8	388.5± 12.1

Table (9) Mean Energy and selected macronutrients intake ± SD per day among Girls 6-<12 years in EL Behaira governorates.

Variables	Urban			Rural		
	Normal (34)	Obese (26)	Total (60)	Normal (27)	Obese (22)	Total (49)
	mean± SD	mean± SD	mean± SD	mean± SD	mean± SD	mean± SD
Energy (Kcal) intake	2305± 241.0	3092± 323.3	2699± 332.0	2328 ± 236.2	3072± 119.8	2700± 177.0
Mean RDA (Kcal)	2250	2250	2250	2250	2250	2250
% intake from RDA	102.4%	137.4%	120.0%	103.5%	136.5%	120.0%
Total protein (g) intake	91.0 ± 7.2	108.2± 8.7	99.6± 3.0	85.6± 3.5	97.1± 12.9	91.4± 12. 1
RDA for protein /g	36.5	36.5	36.5	36.5	36.5	36.5
% intake from RDA	249.3%	296.4%	273.0%	234.5%	266.0%	250.4%
Total fat (g) intake	72.1 ± 14.0	125.1± 14.2	98.6± 14.0	71.8± 10.1	93.7 ± 10.5	82.4± 10.0
Cholesterol (mg) intake	169.4 ± 16.9	313.7± 16.8	241.6± 16.0	177.6± 12.5	229.0± 17.9	203.3± 14.2
Carbohydrates (g) intake	322.9± 10.5	383.3 ± 9.5	353.1± 10.0	335.0 ± 12.1	460.1± 10.0	397.5± 16.6

Table (10): Mean Minerals intake ± SD per day among Boys 6-<12 years in the different study groups in EL Behirra governorates.

Variables	Urban			Rural		
	Normal(17)	Obese(24)	Total(41)	Normal(12)	Obese (26)	Total(38)
	mean± SD	mean± SD	mean± SD	mean± SD	mean± SD	mean± SD
Calcium(mg) intake	1149.3± 31.0	1346.3± 58.0	1247.8±45.0	833. ±25.1	874.4±32.8	853.7±29.0
Mean RDA/mg	1000	1000	1000	1000	1000	1000
%intake from RDA	114.9%	134.6%	124.8%	83.4%	87.4%	85.4%
Iron (mg) intake	25.6± 4.0	30.3± 3.1	28.0±3.2	26.2± 1.8	26.1± 4.5	26.1±1.6
Mean RDA/mg	11	11	11	11	11	11
%intake from RDA	232.7%	275.5%	254.5%	238.2%	237.3%	237.3%
Zinc (mg) intake	11.1± 2.8	11.1± 3.8	11.1±3.3	10.2± 2.4	11.8± 3.4	11.0±2.8
Mean RDA/mg	12.5	12.5	12.5	12.5	12.5	12.5
%intake from RDA	88.8%	88.8%	88.8%	81.6%	94.4%	88.0%
Copper(µg) intake	0.05± 0.007	0.04± 0.005	0.045±0.003	0.05± 0.001	0.14± 0.02	0.1±0.01
Mean RDA/ µg	2	2	2	2	2	2
%intake from RDA	2.5%	2.0%	2.25%	2.5%	7.0%	5.0%
Selenium(mg)intake	38.0± 3.3	37.2± 4.9	37.6±6..1	35.6± 4.9	38.1± 1.3	36.9±3.6
Mean RDA/mg	35	35	35	35	35	35
%intake from RDA	108.5%	106.3%	107.4%	101.7%	108.9%	113.1%

Table (11): Mean Minerals intake ± SD per day among Girls 6-<12 years in the different study groups in EL Behaira governorates.

Variables	Urban			Rural		
	Normal (34)	Obese (26)	Total(60)	Normal (27)	Obese(22)	Total(49)
	mean± SD	mean± SD	mean± SD	mean± SD	mean± SD	mean± SD
Calcium(mg) intake	1111.4± 48.1	1043.5± 44.5	1077.5±42.5	884.3± 42.7	783.5± 33.2	833.9±37.9
Mean RDA/mg	1000	1000	1000	1000	1000	1000
%intake from RDA	111.1%	104.3%	107.8%	88.4%	78.4%	83.4%
Iron (mg) intake	23.7± 3.7	22.7± 2.8	23.2±1.8	33.2±4.4	24.8± 2.4	29.0±1.9
Mean RDA/mg	11	11	11	11	11	11
%intake from RDA	215.5%	206.4%	211.0%	301.8%	225.5%	263.6%
Zinc (mg) intake	9.7± 0.7	9.8± 1.3	9.75±0.8	10.4± 1.3	10.6± 1.6	10.5±2.4
Mean RDA/mg	12.5	12.5	12.5	12.5	12.5	12.5
%intake from RDA	77.6%	78.4%	78.0%	83.2%	84.8%	84.0%
Copper (µg) intake	0.05± 0.013	0.09± 0.01	0.07±0.015	0.10± 0.02	0.14± 0.03	0.12±0.025
Mean RDA/ µg	2	2	2	2	2	2
%intake from RDA	2.5%	4.5%	3.5%	5.0%	7.0%	6.0%
Selenium (mg) intake	33.7± 4.4	31.1± 3.3	32.4±1.4	35.9± 2.8	35.5± 2.9	35.7±2.0
Mean RDA/mg	35	35	35	35	35	35
%intake from RDA	96.3%	88.9%	92.6%	102.6%	101.4%	102.0%

Table (12): Mean intake of Water soluble vitamins ± SD per day among Boys 6-<12 years in the different study groups in EL Behirra governorates.

Variables	Urban			Rural		
	Normal (17)	Obese (24)	Total(41)	Normal (12)	Obese (26)	Total(38)
	mean± SD	mean± SD	mean± SD	mean± SD	mean± SD	mean± SD
Thiamin (mg)	1.5± 0.06	1.5± 0.07	1.5±0.06	1.3± 0.04	1.4±0.06	1.35±0.05
Mean RDA/ mg	1.25	1.25	1.25	1.25	1.25	1.25
%intake from RDA	120.0%	120.0%	120.0%	104.0%	112.0%	108.0%
Riboflavin (mg)	3.0± 0.5	3.3± 0.2	3.15±0.3	2.1± 0.1	2.1±0.1	2.1±0.1
Mean RDA/ mg	1.35	1.35	1.35	1.35	1.35	1.35
%intake from RDA	222.0%	244.4%	233.0%	155.6%	155.6%	155.6%
Niacin (mg)	1.93± 0.06	2.15± 0.09	2.04±0.07	1.67± 0.05	1.98± 0.07	1.79±0.06
Mean RDA/ mg	1.5	1.5	1.5	1.5	1.5	1.5
%intake from RDA	128.7%	143.3%	136.0%	111.3%	132.0%	119.3%
Folic acid (µg)	117.3± 8.9	97. 6± 4.5	107.5±6..2	95.5± 6.4	75.5± 3.4	85.5±4.0
Mean RDA/ mg	125	125	125	125	125	125
%intake from RDA	93.8%	78.1%	86.1%	76.4%	60.4%	68.4%
Vitamin C (µg)	135.2± 7.8	109.3± 7.0	122.2±7.0	100.6± 7.7	145.6± 8.4	123.1±8.0
Mean RDA/ mg	47.5	47.5	47.5	47.5	47.5	47.5
%intake from RDA	284.6%	230.1%	257.3%	211.8%	306.5%	259.2%

Table (13): Mean intake of Water soluble vitamins ± SD per day among Girls 6-<12 years in the different study groups in EL Behaira governorates.

Variables	Urban			Rural		
	Normal (34)	Obese (26)	Total(60)	Normal (27)	Obese (22)	Total(49)
	mean± SD	mean± SD	mean± SD	mean± SD	mean± SD	mean± SD
Thiamin (mg)	1.3± 0.05	1.3 ±0.05	1.3±0.05	1.5± 0.04	1.4± 0.04	1.45±0.05
Mean RDA/ mg	1.25	1.25	1.25	1.25	1.25	1.25
%intake from RDA	104.0%	104.0%	104.0%	120.0%	112.0%	116.0%
Riboflavin (mg)	3.2± 0.1	3.2± 0.6	3.2±0.3	2.3± 0.2	1.9± 0.1	2.1±0.4
Mean RDA/ mg	1.35	1.35	1.35	1.35	1.35	1.35
%intake from RDA	237.0%	237.0%	237.0%	170.4%	140.7%	155.0%
Niacin (mg)	1.97±0.05	1.91± 0.07	1.93±0.08	1.82± 0.06	1.95± 0.04	1.9±0.05
Mean RDA/ mg	1.5	1.5	1.5	1.5	1.5	1.5
%intake from RDA	131.3%	127.3%	128.7%	121.3%	130.0%	126.7%
Folic acid (µg)	86.1±7.7	76.4± 4.0	81.3±4.1	79.8 ± 9.4	61.8± 3.2	70.8±3.1
Mean RDA/ mg	125	125	125	125	125	125
%intake from RDA	68.9%	61.1%	65.0%	63.8%	49.4%	56.6%
Vitamin C (µg)	106.7± 5.8	128.2± 9.5	117.5±8.6	114.6± 7.5	173.2± 7.3	143.9±8.4
Mean RDA/ mg	47.5	47.5	47.5	47.5	47.5	47.5
%intake from RDA	224.6%	269.9%	261.1%	241.3%	364.6%	302.9%

Table (14) Mean intake of Fat soluble vitamins ± SD per day among Boys 6-<12 years was in the different study groups in EL Behirra governorates.

Variables	Urban			Rural		
	Normal(17)	Obese(24)	Total(41)	Normal(12)	Obese (26)	Total(38)
	mean± SD	mean± SD	mean± SD	mean± SD	Mean ± SD	mean± SD
Vitamin A (Retinol equivalent RE)	956.3± 47.9	981.2± 32.7	968.8±40.3	636.2± 38.6	773.9± 35.3	705.0±37.0
Mean RDA (Retinol equivalent RE)	850	850	850	850	850	850
%intake from RDA	112.5%	115.4%	114%	74.8%	91.0%	82.9%
Vitamin 'E'/mg	6.4± 0.4	6.0± 0.9	6.2±0.2	6.6± 0.2	7.5± 0.7	7.1±0.9
Mean RDA/ mg	8.5	8.5	8.5	8.5	8.5	8.5
%intake from RDA	75.3%	70.6%	72.9%	77.6%	88.2%	83.5%

Table (15): Mean intake of Fat soluble vitamins ± SD per day among Girls 6-<12 years was in the different study groups in EL Behaira governorates.

Variables	Urban			Rural		
	Normal (34)	Obese (26)	Total(60)	Normal(27)	Obese (22)	Total(49)
	mean± SD	mean± SD	mean± SD	mean± SD	Mean SD	mean± SD
Vitamin A (Retinol equivalent RE)	1058.2± 52.4	930.2± 42.1	994.2±47.3	668.3± 31.8	763.9± 37.1	716.1±34.5
Mean RDA (Retinol equivalent RE)	850	850	850	850	850	850
%intake from RDA	124.5%	109.4%	117.0%	78.6%	89.9%	84.2%
Vitamin 'E'/mg	5.5± 0.4	5.5± 0.3	5.5±0.8	7.1± 0.7	7.5± 0.7	7.3±0.2
Mean RDA/ mg	8.5	8.5	8.5	8.5	8.5	8.5
%intake from RDA	64.7%	64.7%	64.7%	83.5%	88.2%	85.9%

Table (16) Mean ± SD of Body Composition Fat Analyzer according sex, site and age group in EL- Behaira governorate.

Age	Variables	Site			Sex			Weight status		
		Urban	Rural	P	Boys	Girls	P	Normal	Obese	P
		mean± SD	mean± SD		mean± SD	mean± SD		mean± SD	mean± SD	
6-12	BMR (Kcal)	1382.0± 74.0	1375.2± 48.0	0.81	1509.6± 92.0	1291.0± 27.0	0.000*	1262.8± 54.0	1502.3± 20.0	0.000*
	FM (Kg)	15.8± 1.12	16.3± 1.36	0.61	16.4± 1.52	15.7± 1.81	0.409	11.6± 0.37	20.7± 1.48	0.000*
	FFM (Kg)	31.1± 5.41	31.0± 4.59	0.90	31.9± 5.16	30.4± 5.05	0.039*	30.1± 4.32	31.8± 5.82	0.095
	TBW (Kg)	22.8± 3.96	22.7± 3.36	0.00*	23.4± 3.78	22.3± 3.70	0.038*	22.0± 3.2	23.3± 4.26	0.096

*BMR: Basel Metabolic Rate *FM: Fat Mass *FFM: Fat Free Mass
*TBW: Total Body Water *****Significantly Different at P < 0.05

Table (17) mean and SD values of laboratory parameters of children 6-<12 years according to weight status in EL Behaira governorate

gender and Parameters		Urban			Rural			*P
		Normal	Obese	Total	Normal	Obese	Total	
boys	Glucose mg/dl	84.5± 6.1	93.5±7.8	89.0±7.0*	93.4 ±12.7	101.6±8.0	97.5±5.4*	0.00
	Cholesterol mg/dl	171.1± 8.0	194.9 ±6.9	183.0±12.5	158.4±10.0	195.8±6.6	177.1±3.3	NS
	H.D.L mg/dl	54.5± 1.2	48.4 ±0.2	51.5±0.7*	44.2±1.0	41.8±0.6	43.0±0.9*	0.00
	L.D.L mg/dl	89.4± 1.4	101.4±1.7	95.4±1.3*	74.0±2.7	103.1±2.3	88.6±2.4*	NS
	Triglycerides mg/dl	104.1±2.5	110.9 ±3.8	107.5±3.2	111.1±4.8	125.0±3.5	118.1±3.8*	0.00
	T.S.H mg/dl	6.5±0.7	4.01 ±1.1	5.3±0.9	5.1 ±0.0	4.42±1.7	4.8±0.8*	NS
	Chromium µg/dl	0.4±0.0	0.45 ±0.0	0.43±0.0*	0.3 ±0.0	0.33±0.01	0.32±0.05	NS
	Zinc mg/dl	10.9± 0.1	12.2 ±1.01	11.6± 1.6*	12.95±1.6	11.65±2.9	12.3± 2.3*	NS
Girls	Glucose mg/dl	91.3± 122.	95.7 ±14.7	93.5±11.0	98.0±9.3	108.0±12.4	103.0±13.9*	0.0
	Cholesterol mg/dl	160.2± 23.4	194.2 ±28.5	177.2±16.0	156.2±12.6	190.8±16.4	173.5±14.5	NS
	H.D.L mg/dl	4885.± 10.8	43.0± 10.3	43.93±10.5	45.6±10.3	492.± 13.7	46.4±11.7	NS
	L.D.L mg/dl	97.2 ±23.4	102.1 ±14.4	99.7±18.9	97.5±49.4	125.6±13.8	111.6±16.6*	0.0
	Triglyceride mg/dl	104.8 ±10.6	110.7 ±28.0	107.8±14.3	103.2±17.5	116.3±41.7	109.8±39.2*	NS
	T.S.H mg/dl	3.1±1.3	1.66 ± 0.0	2.4±1.3	2.33±1.1	1.1 ±0.0	1.7±1.0*	0.0
	Chromium µg/dl	0.3 ±0.1	0.4 ±0.14	0.35±0.12*	0.33± 0.1	0.3±0.0	0.32±.01	0.0
	Zinc mg/dl	10.6± 1.5	16.4 ± 2.5	13.5± 2.0*	12.1± 1.8	15.53±2.4	13.8±2.1*	NS

- *Significantly Different at P < 0.05 between sex

  ***P** Significantly Different at P < 0.05 between sites.

الملخص العربي

التقييم التغذوي لأطفالِ المدارس الإبتدائيةِ البدناء في المناطق الحضريةِ والريفية في محافظةِ البحيرة - مصر

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المعهد القومي للتغذية

مقدمة: يزداد انتشار البدانة في كل من الدول المتقدمة والنامبية على حد سواء. السمنة تُرتَبطُ بالأخطار المتزايدةِ والعديد مِنْ الأمراضِ. كما تُؤثِّرُ السمنةُ على نوعيةِ الحياةِ بشكل ملحوظ وتُخفّضُ توقّعَ متوسطَ العمر.

الهدف: معرفة مدىّ تأثيرَ البيئةِ الحضريةِ و الريفية في محافظةِ البحيرة على مستوى جلوكوزِ الدمِ وبدانةالأطفالِ بعمرِ 6-12 سَنَوات لمعْرِفة عواملِ الخطرِ المحتملةِ.
تمت هذه دراسةِ بعيّنة ممثلة مِنْ الأطفالِ 6-12 سنة مِنْ العُمرِ أثناء يوليو2004 حتى 20 يونيو 2005.

الطرق:تم تحديد المقاييس الجسمية للاطفال وكذلك معرفة كمية المتناول من الغذاء ومحتوى هذا الغذاء من العناصر الغذائية ومقارنتهابالتوصيات الدولية لنفس العمر، كما تم تحليل بعض العوامل البيوكيميائية ببلازما الاطفال.

النتائج: اظهرت النتائج ما يلي:
كان انتشار السمنةفي البنات(13.8%و 11.7) بينما اللاولاد (12.7 و 13.8%)في الحضر والريف على التوالي.
وظهرت هذه العادات الغذائية : أن نسبة 78% و 84.2% على التوالي و 83.3% و89.8 % على التوالي من الاولاد والبنات البدناء في الحضر والريف يتناولون وجبات خفيفة بين الوجبات . وهناك نسب متفاوتة بين الاولاد في الحضر والريف يتناولون طعامهم اثناء مشاهدة التلفزيون.
كما اوضحت نتائج التحاليل البيوكيميائية أن هناك فرق معنوي بين مستوى الجلوكوز في سيرم الاطفال الطبيعيين والبدناء . اما هرمون الثيروكسين فلم ةيظهر فروق معنوية. بينما محتوى السيرم من الجليسريدات الثلاثية فكان هناك فرق معنوي بين الحضر والريف وكذلك بين الاطفال الطبيعيين والبدناء في الريف.