CPQ Medicine (2021) 11:4
Research Article

Nutritional Habits of Egyptian Primary School Female Children

Enas S. Abbas, Hassan A. Shora*, Hoda A. Abdel Salam & Enas F. Elngar

Department of Pediatrics and Department of Nutrition and Food Science, NNI, National Nutrition Institute, Port-Said university and Suez Canal University, Egypt

***Correspondence to:** Dr. Hassan A. Shora, Senior Research Scientist, Head of Medicine & Diabetes Center, Port-Said University & Ismailia General Hospital, Egypt.

Copyright

Received: 03 February 2021

Published: 10 February 2021

Keywords: *Nutritional Habits; Assessment; Female School Children; Obesity*

Abstract

Background

Nutritional habits are very important regarding the healthy status of female primary school children. This study aimed at identifying the nutritional habits of female primary school children and their relationships with anthropometric, sociodemographic, physical activities and overweight/obesity.

Methods

A cross-sectional study that included 200 female primary school children aged 6-12 years who attended the pediatrics outpatient clinic of National Nutrition Institute, Cairo, Egypt. The participants were randomly selected from January to June 2020.

For each child sociodemographic data, nutritional habits, dietary food intake, physical examination and physical activities. Dietary analysis was done for essential micronutrients, iron, calcium, riboflavin, retinol, thiamine, and vitamin C levels.

Results

Obesity was prevalent in female school children 34.5%, eating food snacks while watching TV representing (87%), of obese children, with positive correlation between obesity and taking snacks between meals (91.8%) in girls of obese children. However all girls in this study used to take junk snacks. The main items of these snacks were unhealthy fast foods. Only a small percentage of studied girls ate vegetables and fruits 29%. Inadequate intake of riboflavin in 54.2%, thiamine 32.8%, iron 22.1% and calcium 18.4%.

Conclusion

This study demonstrated that eating while watching T.V, unhealthy snack consumption increased intake of the refined CHO food supply in the form of processed grain, soft drinks, sweeteners and lack of physical activity was the most important contributory factors of obesity among primary school female children.

Introduction

The era of intense development is childhood. It is the time in which the development of the individual's growth rate has increased rapidly [1]. The primary school years (6-12 years) were recognized as a crucial time for an increase in the Z-score index of body mass (BMI) [2]. Children's nutritional status and dietary patterns are effective and have negative effects for the individual's health [3]. Childhood healthy eating and physical activity are important for good health, growth and development [4,5], and unhealthy diets and lack of physical activity raise the risk of children being at risk of obesity and associated health difficulties [6,7].

Dietary Effects of Globalization and Urbanization: A rapid rise in the intake of highly processed/energy-dense foods with low nutritional value has been determined by trends. The dietary effect of Globalization and Urbanization, a rapid rise in highly processed consumption has been determined by trends. In addition to ready-to-eat products [8-10], this contributes to the deterioration of dietary habits, especially among young people. With the concerning increases in overweight and obesity in teenagers, young people's eating habits warrant special consideration not only because of the direct effects on weight status [11], but also increased risk in adulthood of cardio-metabolic disorders, such as diabetes type 2, hypertension, metabolic syndrome [12], and the impact of obesity on increased mortality risk and shortened life expectancy are also seen in studies [13].

A greater prevalence of chronic non-communicable diseases from childhood to adulthood has been linked with the change to Western dietary patterns [14]. The most important factors affecting the status of obesity and wellbeing during childhood are most of the non-communicable diseases embedded in childhood, balanced diet and eating habits, nutritional status and breakfast intake. The most effective factor is the weight status of the child [15]. As defined by the World Health Organization, healthy nutrition is a "cornerstone of good health" [16]. Good healthy diet is a significant prevention of obesity in children and their youth [17], as children are rising at this particular age and require sufficient and healthy nutrition in order to have

appropriate growth conditions [18]. School children are often more involved, so they need better nutrition more often [19]. There is solid evidence that insufficient nutrition is associated with impaired growth and slow mental development [20].

Consumption of plant-based foods, in particular fruits, vegetables and legumes, is considered a healthy habit among food behaviors because of the potential for overweight and obesity prevention and some non-communicable diseases [21,22]. A balanced diet at a young age ensures enhanced growth and health status in adult life [17]. Daily consumption of breakfast will be an effective cure for sufficient calorie intake and a balanced lifestyle later at a younger age [23]. International dietary targets for consumption of fruits and vegetables (F&V) (400g/day) have been set because of their impact on disease prevention and health status maintenance [24]. Skipping breakfast can also indirectly impact the academic performance of children, which means that if children considered breakfast intake at this age, the risk of obesity will be significantly reduced [15], which is an obstacle to students' academic performance [25]. Since the nutritional status and dietary habits of children may be effective and have negative implications for the health of the person [3], regular consumption of breakfast is recommended at various ages, especially in early childhood [26].

Aim of the work

The current study designed to assess the nutritional status and dietary habits of the female children in the primary school age stage.

Subjects and Methods

Study Design

It is a descriptive cross-sectional study performed to assess the nutritional habits of some of the primary school-age females' children of 6 - 12 years old who have attended the Pediatric out clinics of the National Nutrition Institute in Cairo, for dietary advice.

Inclusion Criteria

- Female children in the primary school age of 6-12 years old

- The parent of children accepted to enroll in the study

- Medical records contain three separate 24 hrs recalls of daily intake of the children and a food frequency Questionnaire.

Exclusion Criteria

- Female children who had any chronic systemic diseases, diabetes, heart diseases, chronic malabsorption, gastrointestinal diseases, kidney disease, and food allergy excluded from the study.

Sample Size and Collection

The study included 200 participants of female children in the primary school stage aged from 6 - 12 years old. Simple random selection performed to enroll the participants of primary school female children who have attended the Pediatric outpatient clinic of the National Nutrition Institute, Cairo, Egypt, for a period of six months from January to June 2020.

All Eligible Female Children Subjected to the Following

- Anthropometric Measurements

The female children asked to take off the heavy clothes, shoes, and belts during the anthropometric measurements, the height-for-age, weight for age, and body mass index (BMI) for age Z-scores of WHO growth references curves of specific age and sex used [27]. The series of three measurements done and the average for each female child calculated. The data plotted on WHO growth reference curves.

Weight for Age

Weight was measured using a platform scale; the scale was standardized by known weight before the use in each studied site and corrected according to the test. The subject was standing barefooted with light clothing on the center of the platform without touching or leaning on anything and the weight measured to the nearest 0.1kg.

Weights status was determined according to Z-score reference growth curves of the World Health Organization [27], and categorized into:

Normal weight range from - 2 SD to + 2SD

Underweight < - 2SD

Overweight > + 2SD

Obese > + 3SD

Height for Age

Standing Height recorded using the raven minimeter, with direct reading of height with an accuracy of +/- 0.1cm. It was on the floor with the back resting against the upright to which the minimeter if fixed. The child was placed barefooted on a flat surface, with weight distributed evenly on parallel feet with heels, buttocks, shoulders, and back of head touching the wall. The head held comfortably erect so that the line of vision of the outer border of the orbit with the external auditory meatus in the same horizontal plane was vertical on the body. The measuring arms are brought down on the subject's head with the back plate tightly against the wall head. The red cursor line was giving the accurate height measurement. The height measured to the nearest 0.1cm.

Heights status was determined according to Z-score reference growth curves of the World Health Organization WHO [27], and categorized into:

Short stature < - 2SD

Normal height range from - 2SD to + 2SD

Tall > + 2 SD

Body Mass Index (BMI) for age (Kg/Hg m²):

BMI calculated by the equation of the weight (in kg) divided by square of height (in meter), then result of the equation of each female child put on the age and sex-specific BMI Z-score growth curves of the World Health Organization [28], classified as:

Normal BMI range -2 to + 2 SD

Over weight: BMI> +2 SD

Obese: BMI > +3 SD

Underweight: BMI < -2 SD

Informed written consent signed from both parents of participants obtained.

- Dietary Assessment:

Methods used for measuring food consumption of eligible children classified into two major groups. The first one, known as the quantitative daily consumption method, consists of recalls or records designed to measure the quantity of foods consumed over one day periods " twenty-four hours recall" method. The second method included the dietary pattern (Food Frequency Questionnaire).

1) The first one is twenty-four hours recall (24hrs recalls) used for three separate days, including the holiday, school day of female children, and during the shopping day with their mothers or families over the last week. Twenty-four hours recall taken from every child's mother or the child according to her age to calculate the range of quantities of daily food consumed over one day period of the three separate days. The quantities of food consumed were estimated in the household measures by grams and achieved by the using of the pre-prepared list of weights of commonly used household measures in Egypt developed by the National Nutrition Institute. The food composition tables (FCT) of Nutrition Institute [29], used to determine the energy and nutrients child intake's of each adequacy of the diet consumed and assessed by comparing these energy and nutrients intake of the child with her recommended dietary allowances of age and sex "RDA" [29,30]. Sight and life / Newsletter [31], a food Coding system was used based on 2 digits denoting food group, 2 digits denoting food items, and 2digits denoting the method of preparation analysis of grams of food and beverages to energy and nutrients carried out by computer with a certain program.

2) The second method included the dietary pattern, food frequency Questionnaire. This method used to give qualitative descriptive information of the dietary patterns of primary school female children who recruited in the study about the food groups in the last week:

· Protective groups as fruits, vegetables either fresh or cooked.

· Energy food as cereals and fat, tubers, and sweets.

· Bodybuilding food: animal and plant protein as egg, fish and meat, chicken, legumes, milk and its products. The questions asked about dietary habits as the frequency of meals per day, eating breakfast, fast-food meals, and eating vegetables and fruits per day.

Statistical Analysis

The continuous variables estimated in means & standard deviation (± SD), While the categorical variables estimated in frequency, percentage, and proportion. The estimated energy requirement (EER) calculated for every female child using age, sex, height, weight according to the Institute of the Medicine Dietary References intake equations. One-way ANOVAs test used to compare means of continuous data. Chi-square test used to compare differences in the distribution of frequencies and categorical data among groups.

All analyses conducted using SPSS version 21 [32]. The p-value < 0.05 considered statistically significant. The level of significance for all analyses was 2 sided and set to 0.05.

Results

Table 1 shows that the children of family size more than 5 constituted 68%, and the rest of children 32% are of family size less than 5members. As regards distribution of children body mass index 34.5% are children obese and non-obese are 65.5%.

Table 1: *The distribution of the primary school female children according to the family size & body mass index (Z-score).*

Family number size		
≤5	64	32.0
<5	136	68.0
Body mass index		
Obese	69	34.5
Non obese	131	65.5

Table 2 represents food habits of 200 of primary school female children. The majority of females 63.5% said that lunch is the main meal, and 20.5% take dinner and 16% take breakfast. Also the obese children take breakfast (17.4%), lunch (68.1%), and dinner (14.5%). The study revealed a high percentage of the females take snakes in between meals (84.5%) all obese children take snakes (100%).

Table 2: *Distribution of the weight status of the primary school female children according to some food habits*

Food habits	Non obese		Obese		Total	
	No	%	No	%	No	%
Main mean						
Breakfast	20	15.3	12	17.4	32	16
Lunch	80	61	47	68.1	127	63.5
Dinner	31	23.7	10	14.5	41	20.5
p=0.588						
Snacks in between meals						
Yes	100	76.3	69	100	169	84.5
No	31	23.7	0	0	31	15.5
p=0.030						
Eating during TV watching						
Yes	90	68.7	60	87	150	75
No	41	31.3	9	13.0	50	25
p=0.385						
Consuming fast foods						
Yes	100	76.3	60	87	160	80
No	31	23.7	9	13	40	20
p=0.417						
Eating fruit and vegetables						
Yes	30	22.9	20	29	50	25
No	101	77.1	49	71	150	75
p=0.417						
Type of foods brought at school						
Beverage	100	76.3	69	100	169	84.5
chips	131	100	69	100	200	100
koshari	90	68.7	60	87	150	75
pizza	30	22.9	20	29	50	25
chocolate	100	76.3	49	71	149	74.5
P=0.600						

Most of the female children (75%) are eating during T.V. watching. Also, obese children eat during T.V watching (87%). Also, female children eat (80%) consumed fast food. The obese children take (87%) fast food. About one quarter only (25%) eat fruits and vegetables of the obese children eating fruit and vegetables (29%).

The majority of female children brought beverages and chips (84.5%). The majority of females brought koshari (it is traditional food in our country consist of the rice, macaroni and lentil cooked by oil, about 400-500kcal in small plate), and chocolate (75%, 74.5%) respectively. A few of them brought pizza (25%). Table 2: shows that the daily energy and nutrient intakes of obese children are statistically significantly higher than those for non-obese children.

Table 3 shows that the energy intake as a percent of RDA of the obese children is statistically significantly higher than that of non -obese children ($p<0.0001$). All the obese children consume 100% of RDA or more of energy. Also shows the protein intake as a percent of RDA of obese children is not statistically significantly different from that of non-obese.

Table 3: *Comparison between non obese and obese primary school female children according to energy & protein intake per day (RDA).*

Energy intake per day RDA (%)	**Non obese**		**Obese**		**Total**	
	NO	**%**	**No**	**%**	**No**	**%**
<50	1	0.7	0	0.0	1	o.5
50	6	4.6	0	0.0	6	3.0
75	44	33.6	o	0.0	44	22
100	77	58.8	39	56.5	116	58
150	3	2.3	30	43.5	33	16.5
Total	131	65.5	69	34.5	2oo	100
Protein intake per day RDA (%)	**Non obese**		**Obese**		**Total**	
	NO	**%**	**NO**	**%**	**NO**	**%**
<50	30	22.9	8	11.6	38	19.0
50	24	18.3	13	18.8	37	18.5
75	8	6.1	6	8.7	14	7.0
100	29	22.1	12	17.4	41	20.5
150	40	30.5	30	43.5	70	35
Total	131	65.5	69	34.5	200	100

Table 4 shows that energy intake as a percent of RDA among obese children is statistically significantly higher than that of non-obese children with p- value (<0.0001). All obese children consumed 100% of RDA or more. Also, the table shows that protein intake as a percent of RDA among obese children is not statistically significantly different from that of non-obese children.

Table 4: *Mean ± SD of total energy and nutrient intake among obese and non-obese children*

Energy and nutrients	Non obese (n.131)	Obese (n.69)	p.value
Energy (kcal)	2433.7 ± 497.8	3265 ± 532.7	<0.001
Protein (gm)	47.8 ± 15.8	61.6 ± 13.7	<0.001
Carbohydrates	70.93 ± 2.68	73.53 ± 3.77	<0.002
Fat	25.57 ± 6.11	26.83 ± 3.03	<0.31
Calcium (mg)	475 ±173.3	615.7 ± 222.2	<0.001
Iron (mg)	35.3 ± 28.4	60.5 ± 38.8	<0.001
Retinol (µg)	1004.5 ± 333.9	1197.0 ± 245.9	<0.001
Thiamine (mg)	1.04 ± 0.64	1.35 ± 0.85	0.005
Riboflavin (mg)	0.95 ± 064	1.18 ± 0.76	0.022
Niacin (mg)	15.6 ± 9.0	20.2 ± 14.4	0.008
Ascorbic acid (mg)	43.5 ± 17.1	56.6 ± 18.9	<0.001

Table 5 shows the dietary adequacy of food item among non-obese female children. This might have reflected the inadequate intake of riboflavin (54.2%), thiamine (32.8%), iron (22.1%), and calcium (18.3%).

Table 5: *Frequency and percent distribution of children according to energy and other nutrients as percent of RDA among non-obese children*

	Sever deficiency <60		**Moderate intake 60-90%**		**Normal intake-90-100%**		**Over intake >110**	
Macronutrient								
	NO	%	N0	%	NO	%	NO	%
Energy(kcal)	3	2.3	25	19.1	39	29.8	64	48.9
Protein (gm)	4	3.1	29	22.1	28	21.4	70	55.1
Carbohydrate (gm)	3	2.3	35	26.7	72	55	21	16
Fat (gm)	6	4.5	45	34.4	60	45.8	20	15.3
Micronutrient								
Calcium	24	18.3	44	33.6	29	22.1	34	26.0
iron	29	22.1	24	18.3	21	16	57	43.5
Retinol	3	2.3	14	10.7	21	16	93	71
Thiamine	43	32.8	14	10.7	11	8.4	63	48.1
Riboflavin	71	54.2	17	13.0	14	10.7	29	22.1
Niacin	22	16.8	44	33.6	26	19.8	30	29.8
Ascorbic acid	8	6.1	12	9.2	16	12.2	95	72.5

Table 6 shows that most obese children (94.2%) received more than their energy requirements. Also (82.6%) of children have more than 110% of their RDA of protein. The micronutrients of mineral intake (calcium and iron) found to be deficient in some obese children. Also, vitamins, as thiamine; riboflavin, and niacin are also deficient (21.7%, 40.6%, and 14.5% as percent of RDA (respectively).

Table 6: *Frequency and percent distribution of the children according to energy and other nutrients as percent of RDA among obese children*

	Sever deficiency <60		**Moderate intake 60-90%**		**Normal intake-90-100%**		**Over intake >110**	
Macronutrient								
	NO	%	N0	%	NO	%	NO	%
Energy(kcal)	0	0.0	0	0.0	4	5.8	65	94.2
Protein(gm)	0	0.0	4	5.8	8	11.6	57	82.6
Carbohydrate (gm)	0	0.0	5	7.2	9	13	55	79.8
Fat (gm)	0	0.0	4	5.8	40	58	25	36.2
Micronutrient								
Calcium	3	4.3	20	29.0	18	26.1	28	40.6
iron	8	11.6	8	11.8	7	10.1	46	66.7
Retinol	0	0.0	0.0	0.0	1	1.4	68	98.6
Thiamine	15	21.7	8	11.6	7	10.1	39	56.5
Riboflavin	28	40.6	15	21.7	5	7.2	21	30.4
Niacin	10	14.5	14	20.3	15	21.7	30	43.5
Ascorbic acid	1	1.4	3	4.3	1	1.4	64	92.8

Table 7 shows that the physical activity of studied children including the walking to school, the housework practicing activities and according to types of activates, hours in practicing activates, frequency of practicing sports .kinds of activities transportation used for obesity (walking-transportation-walking and transportation -special car) the percent of obesity (7.2%-6.9%-37.7%-15.5%) respectively, and the type of activities and sports (walking and shopping-light sports-heavy sports-football-volley ball-basketball (0%,33.3%,0%,0%,0%, respectively), and causes of not practicing activates (no time ,illness, no place, no financial (33.3%-0%,37.7%,20%, respectively).

Table 7: *Percentage distribution of weight status of the primary school female children according to the kind of activities*

Kind of activities transportation used	Non obese		Obese		Total	
	No	%	No	%	No	%
Walking (min)	77	58.8	5	7.2	82	41
transportation	23	33.3	9	6.9	32	16
Walking and transportation	52	39.7	26	37.7	78	52.1
Special car	31	23.7	31	15.5	62	31
p=0.579						
Type of activities and sports						
	No	**%**	**No**	**%**	**No**	**%**
Walking and shopping	0	0	0	0	0	0
Light sports	9	6.9	23	33.3	32	16
lheavy sports	30	22.9	0	0	30	22.9
Football	0	0	0	0	0	0
Volley bail	0	0	0	0	0	0
basketball	0	0	0	0	0	0
p=.829						
Causes of not practicing activities						
No time	30	22.9	23	33.3	53	30.1
illness	0	0	0	0	0	0
No place	31	23.7	26	37,7	57	31.1
No financial	100	76.3	20	29	120	60
P=.911						

Discussion

In the development of the child's consciousness and identity, primary education is an essential step. It is known to be an external bridge [33]. Children are remarkably curious at this stage of advancement, and primary education must promote this tendency among children from different racial, cultural, and socio-economic backgrounds [34].

Genetics and diet may be dependent on the differences that occur in children's early developmental abilities [35,36]. Educational and behavioral strategies are required to adjust the dietary habits of children in primary school.

Globally, the number of overweight children estimated in 2010 to be over a 42million, close to 35million of them living in developing countries. The prevalence of obesity is increasing. It is essential to trace certain aspects of lifestyle that predispose to obesity [37]. We conduct a cross-section of a discretional study on primary school female children to found the relation between food habits, physical activity, and obesity.

Children's dietary preferences and physical activity patterns are probably similar early in childhood. Several dietary factors were positively associated with a child's overweight or obesity. The overeating of high-energy foods remained a risk factor for a child's obesity [38].

In the present study the obesity represents (34.5%) among the primary school female children. We highlight the commonest pattern of potential contributory factor to childhood obesity, food references, and physical activity.

As regards food habits, eating while watching T.V taking snacks between meals. We found most obese females (87%) eating at watching TV. Most of the females were taking snacks between meals (100%). Our result is in line with previous study done by Hare B and her colleagues' [39], she reported that the eating during watching T.V associated with increased obesity prevalence.

Snack taking is one of the important points that we assess in our study, we found that the main item of our children snacks was the unhealthy junk foods snacking. In the study, we found a positive correlation between obesity and taking snacks between meals (91.8%) in girls. Our finding supported with the previous studies carried in the USA in 2010 by Chum and these colleagues in which the majority of the girls take pocket money in school (39.9%) bought Biscuits (19%) chips (11%), beverage (10.5%) pizza (71%) nuts and (76%) chocolates.

Junk foods contain food additives, artificial coloring, and artificial colorings, and artificial flavorings. These additives enhance the color; flavor, taste, and texture that made the Kids are the target of the junk food industry. A negative effect of junk food on children is rapid weight gain, often leading to excessive weight and sometimes obesity [40].

Individual adiposity is the result of a complex interplay among genetically determined body habits, appetite, nutritional intake, and environmental factors [41]. There is clear evidence that marketing influences the children's requests. They are regularly targeted with calorie-dense, nutrient-poor food making a trap to obesity. There is a lack of exercise and no walking or jogging or cycling, which together makes them victim of the obesity epidemic [42].

In this study, the fast-food consumption assessed, we found that obese children consumed (87%) fast foods. The study assessed the eating fruit and vegetable consumption and found that obese children consumed (29%). Beverage consumption leads to obesity due to its influence on lipogenesis of insulin secretion or leptin production [43]. Healthy snacks considered to be a part of a healthy diet food are low in saturated fat, cholesterol, high fiber foods including whole-grain foods, vegetables and fruit foods, and a moderate amount of sugar and salts, calcium-rich foods, iron-rich foods to meet a child's daily requirement for essential nutrient.

Parents should pay attention to the content of meals. Meals without vegetables and desserts may increase the intake of high-energy-density food [44]. Missing salads and desserts may also reflect the families' socioeconomic status [45].

The rate of eating is one of the determinant factors for developing obesity [46]. Obese children eat faster and failed to show the normal pattern of slowing down the rate of eating towards the end of the meal.

The data confirm the importance of breakfast and the composition of meals in addition to meal frequency. In our study, we found that the majority of the girls (88.4%) take more than three meals per day not escaping one meal. And lunch was the main meal, and breakfast consumption suggested associating with lower BMI in children [47].

According to previous studies, there was a negative relationship between high consumption breakfast rates and high BMI, the less eating breakfast, the more obesity would find [15,48, 49] few studies have found that there is no significant relationship between breakfast and obesity or overweight [50].

Despite possible higher daily energy intakes in breakfast consumers, regular breakfast eating may lead to more regular eating habits, and healthful food choices, which may contribute to a reduced body mass index. According to previous studies, skipping breakfast may also be related to dieting and disordered eating.

Sarhan *et al.*, [51], who stated that the mean caloric intake of obese students was 3230 calories, as compared with 2489 calories of non-obese students.

Abd EL-Shakoor [52] concluded that female students consumed a smaller amount of energy. Dietary energy is an important consideration in obese and must be adequate for growth and type of effort but not so excessive as the cause obesity [53].

Physical activity has to be a successful method for obesity prevention. Healthy people 2000 calls for increased community availability and accessibility of physical activity by the center Disease control and prevention recently recommended that comprehensive school and community programs developed to promote physical activity among children [54].

In this study, we correlate physical activity and obesity as contributing factors and found that a substantial difference between the level of physical activity in obese and non-obese children. These results found that walking to school was less among obese children compared to non-obese.

Our study is coincident with the previous studies in Norwegian England that found that those walking or Cycling to school were commoner in non-obese than obese children [55].

Conclusion

Our study concludes that the eating during watching T.V, and an unhealthy snack consumption, increased intake of the refined CHO food supply in the form of processed grain, soft drinks, sweeteners and lack of

physical activity are the most important contributor factors of obesity among primary school female children. So the educational and behavioral strategies are required to adjust the dietary habits of children in primary school.

Bibliography

1. WHO (2009). *Early child development*. Fact sheet N, 332.

2. Kries, V. R., Reule, H., Bayer, O., Riedel, C., Diethelm, K. & Buyken, A. E. (2012). Increase in prevalence of adiposity between the ages of 7 and 11 years reflects lower remission rates during this period. *Pediatric Obesity, 8*(1), 13-20.

3. St-Onge, M. P., Keller, K. L. & Heymsfield, S. B. (2003). Changes in childhood food consumption patterns: a cause for concern in light of increasing body weights. *Am J Clin Nutr., 78,* 1068-1073.

4. Timmons, B. W., Naylor, P. J. & Pfeiffer, K. A. (2007). Physical activity for preschool children how much and how? *Can J Public Health., 98*(Suppl 2), S122-34.

5. Story, M., Kaphingst, K. M. & French, S. (2006). The role of child care settings in obesity prevention. *Futur Child., 16*(1), 143-168.

6. Mullen, M. & Shield, J. (2004). Childhood and adolescent overweight: the health professional's guide to identification, treatment, and prevention. Chicago: American Dietetic Association, 2004.

7. Harnack, L., Walters, S. A. & Jacobs, Jr. (2003). Dietary intake and food sources of whole grains among US children and adolescents: data from the 1994-1996 continuing survey of food intakes by individuals. *J Am Diet Assoc., 103*(8), 1015-1019.

8. Moreno, L. A., Rodriguez, G., Fleta, J., Bueno-Lozano, M., Lazaro, A. & Bueno, G. (2010). Trends of dietary habits in adolescents. *Crit Rev Food Sci Nutr., 50*(2), 106e12.

9. Adair, L. S. & Popkin, B. M. (2005). Are child eating patterns being transformed globally? *Obes Res., 13*(7), 1281 e99.

10. Cavadini, C., Siega-Riz, A. M. & Popkin, B. M. (2000). US adolescent food intake trends from 1965 to 1996. *Arch Dis Child., 83*(1), 18e24.

11. Popkin, B. M. (2002). The shift in stages of the nutrition transition in the developing world differs from past experiences! *Public Health Nutr., 5*(1A), 205e14.

12. Lobstein, T. & Jackson-Leach, R. (2016). Planning for the worst: estimates of obesity and comorbidities in school-age children in 2025. *Pediatr Obes., 11*(5), 321e5.

13. Minet Kinge, J. & Morris, S. (2010). Socioeconomic variation in the impact of obesity on health-related quality of life. *Soc Sci Med., 71*(10), 1864-1871.

14. Medina-Ramón, A., Kirwan, R., Lamuela-Raventós, R. M. & Estruch, R. (2018). Dietary patterns and the risk of obesity, type 2 diabetes mellitus, cardiovascular diseases, asthma, and neurodegenerative diseases. *Crit Rev Food Sci Nutr., 58*(2), 262 e96.

15. Szajewska, H. & Ruszczynski, M. (2010). Systematic review demonstrating that breakfast consumption influences body weight outcomes in children and adolescents in Europe. *Crit Rev Food Sci Nutr., 50,* 113-119.

16. WHO (2015). *Health topics*, Nutrition. 2015.

17. Baranowski, T., Mendlein, J., Resnicow, K., Frank, E., Weber- Cullen, K. & Baranowski, J. (2000). Physical Activity and Nutrition in Children and Youth: An Overview of Obesity Prevention. *Preventive Medicine, 31*(2), S1-S10.

18. Rampersaud, G. C., Pereira, M. A., Girard, B. L., Adams, J. & Metzl, J. D. (2005). Breakfast habits, nutritional status, body weight, and academic performance in children and adolescents. *J Am Diet Assoc., 105*(5), 743-760.

19. Karimi, B., Sadat Hashemi, M. & Habibian, H. (2008). Study of the breakfast habits and its relationship with some factors in Semnan (Iran) pupils. *Koomesh, 9*(4), 285-292.

20. Mendez, M. A. & Adair, L. S. (1999). Severity and timing of stunting in the first two years of life affect performance on cognitive tests in late childhood. *J Nutr., 129*(8), 1555-1562.

21. Rebello, C. J., Greenway, F. L. & Finley, J. W. (2014). A review of the nutritional value of legumes and their effects on obesity and its related co-morbidities. *Obes Rev., 15*(5), 392-407.

22. Slavin, J. L. & Lloyd, B. (2012). Health benefits of fruits and vegetables. *Adv Nutr., 3,* 506-516.

23. Basch, C. E. (2011). Breakfast and the achievement gap among urban minority youth. *J Sch Health., 81*(10), 635-640.

24. FAO/WHO (2003). *Diet, nutrition and the prevention of chronic diseases.* WHO technical report series, (p. 1e60).

25. Taras, H. & Potts-Datema, W. (2005). Obesity and student performance at school. *J Sch Health., 75*(8), 291-295.

26. Briggs, M., Safaii, S. & Beall, D. L. (2003). Position of the American Dietetic Association, Society for Nutrition Education, and American School Food Service Association--Nutrition services: an essential component of comprehensive school health programs. *J Am Diet Assoc., 103*(4), 505-514.

27. Mercedes de Onis, Onyango, A. W., Borghi, E., Siyam, A., Chizuru Nishida & Jonathan Siekmann (2007). Development of a WHO growth references for school- age children and adolescents. *Bull World Health Organ, 85*(9), 660-667.

28. Cole, T. J. (2002). A chart to link child centiles of body mass index, weight and height. *Eur J Clin Nutr., 56*(12), 1194-1199.

29. National Nutrition Institute for Egypt, NNI (2006). Food composition table bases on local food analysis and food composition.

30. FAW/WHO/UNU (1985). *Requirements and RDAs: Current Estimates of Average protein intake.* Food and Agriculture organization (FAO) World health.

31. SIGHT AND LIFE. NEWSLETTER 3/2002. 2. Editorial. Contents. o vitamin A and its relatives: marvelous molecules in key life processes. Page 3. O vitamin A, PH Goodman.

32. SPSS (2012). *Statistical Package for Social Science.* Computer Soft, IBM, SPSS Ver. 21 2012., SPSS Company, London, UK.

33. Kuczmarski, R. J., Ogden, C. L., Guo, S. S., Grummer-Strawn, L. M., Flegal, K. M., Mei, Z., *et al.* (2002). 2000 CDC Growth Charts for the United States: methods and development. *Vital Health Stat., 11*(246), 1-190.

34. Hall, A., Khanh, L. N., Son, T. H., Dung, N. Q., Lansdown, R. G., Dar, D. T., *et al.* (2001). An association between chronic undernutrition and educational test scores in Vietnamese children. *Eur J Clin Nutr., 55,* 801-804.

35. Rastogi, P., Nagesh, K. R. & Yoganarasimha, K. (2008). Estimation of stature from hand dimensions of north and south Indians. *Leg Med (Tokyo)., 10*(4), 185-189.

36. Duyar, İ. & Pelin, C. (2010). Estimating body height from ulna length: need of a population-specific formula. *Eurasian Journal of Anthropology, 1*(1), 11-17.

37. Votruba, S. B., Horvitz, M. A. & Schoeller, D. A. (2000). The role of exercise in the treatment of obesity. *Nutrition, 16*(3), 179-188.

38. Marja, V., Raijakorpelainen, Tapannainen, Kaisukakkonen, Hannu Tuulasaukkonen (2009).

39. Hare Brunne, Brigit neilson & Kresein, L. (2011). Watching T.V and obesity, institute of prevension. *BMC med.,* 110311.

40. Zahid Naeem (2012). Increasing trend of junk food use in Saudi Arabia and health implications. *Int J Health Sci., 6*(11).

41. Gahagan, S. (2012). Overweight and obesity Nelson. Textbook of pediatric 19 ed. Edited by Richard E, Behman, Rebert M. Kliegman and HaLB, Jenson, Philadelphia. saunders.

42.WHO (2002). World health organization reporting reducing risks of moting healthy life eat.

43. Bray, G. A., Nielson, S. J. & Popkin, B. M. (2004). Consumption of high fructose corn syrup in beverages may play a role in the epidemic of obesity. *Am J Clin Nutr., 79*(4), 537-543.

44. Ledikwe, J. H., Blanck, H. M., Kettel, K. L., Serdula, M. K., Seymour, J. D., Tohill, B. C. & Rolls, B. J. (2006). Dietary energy density is associated with energy intake and weight stats in US adults. *Am J Clin Nutr., 83*(6), 1362-1368.

45. Laaksonen, M., Prattala, R., Helasoja, V., Uutela, A. & Lahelma, E. (2003). Income and health Behaviours: evidence from monitoring surveys among finish adults. *J EPidemiol Community Health., 57,* 711-717.

46. Jeeny, H. (2008). P*roperties of food and Beverage that influence energy intake and body weight*: In prevention and treatment of nutrition 2th ed, (pp. 438-444).

47. Serra-Majeml, Aranccta, B. J., Perez, Rodrigo, C. (2006). Prevalence and determinants of obesity in Spanish children and young people. *BR J Nutr., 96*(S1).

48. Sjöberg, A., Hallberg, L., Höglund, D. & Hulthén, L. (2003). Meal pattern, food choice, nutrient intake and lifestyle factors in The Göteborg Adolescence Study. *Eur J Clin Nutr., 57,* 1569-1578.

49. Harding, S., Teyhan, A., Maynard, M. J. & Cruickshank, J. K. (2008). Ethnic differences in overweight and obesity in early adolescence in the MRC DASH study: the role of adolescent and parental lifestyle. *Int J Epidemiol., 37*(1), 162-172.

50. Vågstrand, K., Barkeling, B., Forslund, H. B., Elfhag, K., Linné, Y., Rössner, S., *et al.* (2007). Eating habits in relation to body fatness and gender in adolescents--results from the 'SWEDES'study. *Eur J Clin Nutr., 61*(4), 517-525.

51. Sarhan, A. A. (1982). *Prevalence of obesity among preparatory school children in cairo.* Thesis, Submitted to the H.I.P.H.in partial fulifillment of the requiements for the degree of P.H. Alexandria university.

52. AbdEL Shakoor, K. I. (1995). *Genetic study of Egyptian patient with obesity*. MSC. Thesis, faculty of Medicine Ainshams University. (Pp. 15-44).

53. Cahill, G. (1985). *The management of obesity.* Johns HOPKIN, institute Medical, (Pp. 113-116).

54. Lazarou, C. & Soteriades (2006). Children's Physical Activity, T.V, watching and obesity in Cyprus ESEUR, J. *Public Health 2010., 20*(1), 70-77.

55. Cooper, A. R., Anderson, L. B., Wedderkopp, N. & Page, A. S. & Froberg, K. (2005). Physical activity level of children who walk, cycle are driven to school. *American Journal of Preventive Medicine, 293,* 179-184.