Eating Habits and their Associations with Obesity and Underweight in Preschool Children

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ABSTRACT

*T*he defective nutritional habits remains a serious problem of children under five years of age. Bad dietary intake causes malnutrition, which leads to many complications. This study amid to give information about diet quality of underweight and obesity of some Egyptian preschool children. The study was purposed as included (60) preschooler aged 2-<6 years old, with a turbulent linear growth, randomly selected from the outpatient clinic of National Nutrition Institute (NNI) and (30) healthy case in the same age and sex as a control group. All participants were subjected to the baseline assessment (dietary intake including "Twenty four-hour recall "method and "food frequency questionnaire'; anthropometric measurements including weight and height; lab investigation including hemoglobin, serum TSH, T4, T3وvitamin A, and D, concentration. Results showed that mean weight for age Z score is significantly lower among the underweight and higher of obese than the control group. Dietary intake analysis showed that mean intake of all macronutrients was the highest in obesity while micronutrients was lower in both malnutrition groups compared to the control group. All blood values of Hb, TSH, T3, and vitamins A or D were lower among the two malnutrition groups and control group. T4 was higher in underweight group than other groups. Conclusion, it seemed that dietary intake deficiency of several nutrients of malnutrition children intake might play an important role of their growth. Preventive strategies to protect against malnutrition and promote healthy eating consumption recommended.

Key words: Diet Quality - Malnutrition – preschool children

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INTRODUCTION

Milosevic, et al., (2012) showed that the food choice practices typically viewed as patterns of human activity or as a dynamic process that integrated within the social structures of these patterns. Bad eating habits, children's diet is rich in calories, at the same time being deficient in elements necessary for proper development such as: vitamins, macro- and microelements, fiber, and unsaturated fatty acids. The examples of such bad eating behaviors are eating in front of the TV, snacking between meals, most often highly processed and calorie-rich foods, skipping breakfasts, drinking sugar-sweetened beverages **(Inadera, 2013).**

A pattern of consumption and diet can be modifiable risk factors, and its influence on health, **(So et al., 2017; Johnson et al., 2018)**. The analysis of dietary patterns has been identified as a more realistic representation of dietary habits, **(Cunha et al., 2018),** since it takes into account the complex interactions between nutrients and other components of a diet, thus making interventions to alteration eating habits possible **(So et al., 2017; Johnson et al., 2018)**.

Few studies (Moreira et al., 2010 and Craig et al., 2010) have found the relationship between sweets, unhealthy snacks, low-quality dietary patterns, and weight among children and this referred to some culture. Obesity is the positive energy balance caused by accumulation of body fat, which means that more energy consumed than expended during metabolism. The most popular method to assess whether the body mass is adequate is the body mass index (BMI) which is calculated from a person's weight and height **(TIOTF, 2005).** Increased risk of cardiovascular disease, diabetes, hyperlipidemia, hypertension, and metabolic syndrome are physical and psychological problems related to childhood obesity, **(Andrade, et al., 2010; Weiss and Caprio, 2005)** as well as poor body image, self-esteem and overall well-being **(Swencionis and Rendell, 2012).**

Malnutrition is among children in poor countries, and a significant proportion of affected children suffer and die if they

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untreated **(Cheung, 2006).** When World Health Organization (WHO) growth standards are used, the risk attenuated for children smaller weight **(Black et al., 2008)**

This study will investigate to the dietary patterns of both underweight and obese Egyptian preschool children as compared to normal children.

SUBJECTS & METHODS

This is a study, carried out on 90 preschool children aged (2- <6 years) attending outpatient clinic of National Nutrition Institute (NNI), Cairo during the period January 2019 to July 2019. Children were divided into three groups: Group control (normal group), this group (30 healthy children) matched age and sex with the other two groups (obesity and underweight) which were classified by weight for age.

After taking verbal consent from the parents, of each the studied cases as well as the controls subjected to the following procedures.

- Assessment of the social class of the family estimated

according to **Fahmy and El Sherbeni (1983)**.

- ***Dietary Intake:*** the study participants assessed by means of two quantitative non-consecutive 24-hour dietary recalls (one for a weekday and the other for a weekend). The energy and main nutrients content of the 24-hour food intake was computed through the food composition tables of the national nutrition institute (**NNI, 2006**). The vitamin and mineral contents of food and beverages consumed was compared to the recommended nutrient intake based on the report of joint **WHO/ FAO**Expert Consultation on human vitamin and mineral requirements **(2002).**

- ***Dietary pattern '' Food Frequency Questionnaire''***

This method used to obtain qualitative descriptive information about usual food and beverage consumption pattern for the whole family per week (daily, less than 3 times per week or equal or more than 3 times per week and monthly).

- *Anthropometric measures* measured according to standardized methods of the World Health Organization **(WHO, 1995)**. Measurements taken included: The Childs weight, length or height, and their Z-score is calculated. Z-score (or SD-score) = (observed value − median value of the reference population) / standard deviation value of reference population. Z score was calculated of weight for age using the computer program ANTHRO [version 1.01 1990].

  - Measurement of weight**:** The body weight measured using the Platform scale *(Ghalli et al., 2002).*

  - Measurement of height or length: The height measured to the nearest centimeter, row data entered separately to the WHO Growth charts for age and sex *(Ghalli et al., 2002).*

- *Laboratory investigations*:

  - *Collection of Specimens:*
- *Blood samples*.
  Collected from fasting children between (9 and 10 a. m). 5ml venous blood samples withdrawn and divided into 2 specimens. The first sample collected in EDTA vacutainer tubes for doing a hemoglobin in whole blood concentration: by **Drabkin, (1949).** The second sample separated serum by centrifugation (3000 rpm 10 min) and were stored frozen at -70º C until analysis done. Serum Zinc measured by the colorimetric method, (Crest Biosystems) according to **(Makino, 1991)**. Serum Calcium: By Colorimetric determination using the kits from bioMerieux France **(Kaplan, and Pesce, 1996).** Serum TSH, T3, T4: By immunometric assay using ELIZA kit manufactured by BioSource Europe Belgium. TSH **(Fisher, 1996),** T 3 according to **(Wild, 1994)** and T4 **(Arem and Escalante, 1996).** Serum vit. A: By **Bieri et al.,**

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(1979).
25hydroxyvitamin D measurement according to **Lensmeyer et al., (2006).**

- *Statistical data analysis:*

Data analyzed by using SPSS (version 16). Data for all variables presented as means with their standard deviations; Comparison of means made using unpaired student's t-test. P values of (<0.05) were considered significant were identified **by Artimage and Berry** (**1987).**

- *Ethical considerations:*

An informed consent obtained from the parents of the children before getting them involved in the study according to the rules of the ethics committee of the National Nutrition Institute. The steps of the study, the aim, the potential benefits, and hazards all discussed with the parents.

RESULTS & DISCUSSION

Table (1) described the sample characteristics (gender, age, and economic class). It showed that the male number was higher than female for normal and underweight groups. While obese children male and female was equal number. In the same table children age was among 2-<6 y as a preschooler. The highest percentage of low economic was in normal and obese groups.

Table (2) showed that there are high significant difference between the three groups as regard their weight, height, body mass index (BMI)-z-score and BMI-percentile. The highest value of weight and height were in obese group. Z-score of obesity group was (3.8) more than -2SD while normal group was (1.4) in normal range (*-2 to + 2 SD)* **(WHO, 1995)**. The obese group was (100%) more than 95[th]percentile, but control group was (80.8) in healthy weight (less than 85th) according to the learner chart of BMI percentile **(Shypailo 2020)**. Group 3 was less than 5th percentile that means this group underweight according to **WHO, (1995).** This BMI-calculator automatically adjusts for differences in height, age, and gender, making it is one of the best tools for evaluating a growing child's weight **(Shypailo 2020).** In practice, HA Z-score or WH Z-

score are calculated: the differences between the observed values and the growth standards as a fraction or multiple of the SD of the mean values of the standards. Because this SD increases with age, the absolute HA difference (cm) has suggested to be more appropriate in terms of identifying the time course of stunting and appropriate periods for intervention (**Leroy et al., 2014**).

Data in table (3) observed that obesity group consumed 153% calorie, 294%protein, 255% carbohydrate and 187% fat from RDA **(WHO, 2014)** versus 89% calorie, 84% protein, 82% carbohydrate and 87% fat of control or normal group. While underweight group consumed 33% calorie, 55% protein, 54% carb and 36% fat from their RDA. A caloric deficit is any shortage in the number of calories consumed relative to the number of calories required for main-tenance of current body weight (energy homeostasis). A deficit can be created by reducing input/calories consumed (lower food intake) A deficit can also be created by increasing output without a corresponding

increase in input. Increased output created by increasing physical activity (**Redman, et al., 2009**). While excess calories are stored throughout in body as fat**.** Excessive fat cells adipose in tissue and accumulation that may impair health', and cause of obesity and overweight is an energy imbalance between calories consumed and calories expended **(WHO, 2014).**

Dietary protein provides key regulatory of growth control in which playing important roles for the accumulation of protein-containing structures. Dietary intake through an amino static appetite mechanism, which enables protein intake to meet the demand, the overall metabolic for amino acids for lean tissue growth linked. Regulation of the demand involves a mechanism in which amino acid intake exerts a largely endocrine-mediated anabolic drive on the growth plate of the long bones, which in turn, through passive stretching, activates growth of associated muscles at the level of muscle connective tissue synthesis. This ensures that skeletal muscle growth occurs at a rate and time course, which

ensures sufficient, muscle mass and strength to allow development of body function with increasing bone length and associated height, and the protein deposition in muscle signals increases in appetite (**Millward, 1995**).

The quantity of dietary protein affect its ability to stimulate the secretion of insulin-like growth factor I (IGF-I) {the mediator of growth hormone}, a hormone that stimulates bone and tissue growth (**Dror and Allen, 2011**). There was substantial emphasis on protein deficiency as one of the main causes of undernutrition in low-income countries (**Semba, 2016**). In recent years, however, biological research has argued that the essential amino acids in animal-sourced foods (ASFs) – "essential" because they cannot synthesized from scratch within the human body – and regulate cellular processes such as growth of bone and skeletal muscle growth (**Semba 2016**).

Mean fat intake was 187% of RDA among obese group compared to 36% of RDA among underweight children. In addition to its function in absorption and transport of fat-soluble vitamins, (some of which are very essential for bone health), fat contains essential fatty acids, which are required for normal growth (**Jones and Kubow, 1999**).

The present results in table (4) illustrated that the minerals iron lower intake of all groups as compared to their RDI. During childhood, iron deficiency could lead to impaired cognitive and physical functionality and increased risk of mortality (**Murray, et al., 2012**). Linear growth inhibition is an immediate response to their deficiency; include protein, iron, and Zn. There is evidence that deficiencies of protein, iron and Zn can occur in the human diet, especially for populations consuming diets based on starchy roots with little or no animal-source foods (ASF). The prevalence of iron and Zn deficiency is widely believed to be widespread in developing countries because of low intakes of animal products, diets high in phytates, which inhibit iron and Zn absorption (**de Benoist, et al., 2007**). Further, zinc deficient makes infants and young children are prone to infections and growth

retardation **(Hess, et al., 2009).** The major cause of micronutrient malnutrition is a diet consisting mainly of staple foods and lacking in animal sources (**Bouis 2003).** Deficiency results from insufficient absorption of iron or excess loss. Absorption tightly regulated in the intestines, depending on the iron status of the individual, the type of iron, and other nutritional factors. Once iron is absorbed, it is well conserved (**Beard 2001**).

This study highlighted the importance of micronutrients and macronutrients consumption among children. Data in table 4 showed that the calcium was the lowest minerals intake in relation to percentage RDI among all groups, followed by phosphorus intake (33%) of underweight versus (51%) of normal group, while obese group was 126%. They also had significantly lower mean values for calcium and phosphorus, which have a significant role in bone growth **(Alshammari et al., 2017).** Calcium intake in this study was extremely low between G1 and G3 as compared to obese group, denoting more compromised

calcium bioavailability. There is some limited evidence for phosphate deficiency occurring through a dietary lack **(Waterlow, 2006),** although phosphate deficiency is likely to be rare. Indeed, average intakes of P and Mg from most diets are usually substantially greater than their biological requirements and, if not, increased absorption.

The finding in table 4 indicated that the all studied groups had low intake of vitamins D compared to % RDA, Vitamin D participates with parathyroid hormone (PTH) in a functional paracrine feedback loop in the growth plate between 1,25(OH)2D and PTH-related protein (PTHrP). Thus 1, 25(OH) 2D decreases PTHrP production, while PTHrP increases chondrocyte sensitivity to 1, 25(OH) 2D by increasing vitamin D receptor production **(Bach, et al., 2014).**

Table (5) showed that the obese group most of them range from 83% to 100% intake Bread, Rice, Baked, Indomie, Potatoes chipsey, triangles cheese, Sugar, Soft drinks, and fast food more than three time per day. 17% only received fresh vegetable more than

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three time in week. 73% assimilation corn oil less than 3 time/day. These food habit give more calorie for obese. 83% and 90% from normal children intake fresh vegetable and cooked vegetable more than 3 time/ day. In addition, fruits represented 87% consumed of normal group. 50% from group 3 received lower than three time /day bread. All food intake for underweight group lowest in calorie and other nutrients. These dietary habits of the three groups had their impact on their growth. In addition, when one self-assesses energy intake, under- and over-reporting consumption may occur **(Dhurandhar et al., 2015).** Dieting is the most described behavioral risk factor for binge eating disorder (BED) onset. It well documented that dieting increases the risk of overeating to counteract the caloric deprivation and, therefore, weight gain over time, but this is more likely to happen during adolescent's stage. Furthermore, some of the above-described psychological risk factors such as body dissatisfaction, perceived pressure to be thin, emotional eating and negative affect interact and mutually reinforce each other, promoting dieting and, therefore, increasing the risk for BED **(Stice et al., 2002).**

The statistical result in table (6) showed that the mean hemoglobin level, TSH, T3, T4, vitamins A, and D were within normal rang among the control group. Obesity and underweight groups were lower value of hemoglobin than control group and normal range with percent change -13 and -20% respectively. Anemia in young children is a serious concern because it can result in impaired cognitive performance, behavioral and motor development, coordination, language development, and scholastic achievement as well as increased morbidity from infectious diseases **(IIPS, 2007).**

TSH level in Obesity and underweight groups were decrease in compare G1 but within normal range. While T3 value in-group, two and three was less than control group and normal level. T4 amount showed increase in underweight group with 69% change compare control group, while obese group was the same value control group. Adaptive

changes in iodine and thyroid hormone metabolism occur with iodine deficiency, initially conserving iodine within thyroid tissue in association with increased TSH and maintaining T4 and T3 levels (subclinical hypothyroidism), eventually followed by reductions in T4 (overt hypothyroidism). Thus, in both severely iodine-deficient and moderately iodine-deficient children, as indicated by their urinary iodine concentration, median T4 concentrations can be in the low–normal range, with only a minority identifiable as hypothyroxinaemia (**Zimmermann, et al., 2007**). Serum total and free T3 concentrations may not decrease until disease far advanced, because increased TSH concentrations stimulate T3 release from the thyroid. Thus, the enlargement of the thyroid may precedeanyfallinT3 and any impairment of linear growth (**Zimmermann, 2007**), and, of these, a recent systematic review identified only two studies which reported on child linear growth, observing no improvements (**Zhou, et al., 2013**). However, when given T4, hypothyroid iodine-deficient children with goitre, short stature and retarded bone age increased in stature (**Hernandez-Cassis, et al., 1995**).

Finding of vitamins, A and D in the same table showed that the reduction value of obese and underweight groups in comparison control group and reference range. **Zulet et al., (2008)** have reported inverse relationship between vitamin A intake and adiposity. Other studies have also reported inverse correlation between serum retinol and body mass index in morbidly obese subjects (**Aasheim, et al., 2008).**

Vitamin D is an essential component of bone and mineral metabolism. It plays a significant role in the homeostasis of calcium and phosphorus and is vital for bone mineralization, skeletal growth, and bone health. A normal vitamin D status seems to be protective against musculoskeletal disorders (muscle weakness, falls and fractures), (**Pludowski et al., 2013).**

CONCLUSION

The dietary patterns derived from the current study based on a considerable number of children

could provide practical information for health authorities designing nutritional interventions and preventive strategies targeting obese and underweight children.

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Table (1) Sample characteristics

Personal characteristics	Categories	Normal children (*N* =30)		Obese children (*N* =30)		Underweight children (*N* =30)	
		No	%	No	%	No	%
Number	Male	18	60%	15	50%	18	60%
	Female	12	40%	15	50%	12	40%
Age groups	2-3 year	9	30%	-------	------	12	40%
	4-5 year	18	60%	18	60%	9	30%3
	>5-<6 year	3	10%	12	40%	9	0%
Economic class	Low	18	60%	16	55%	14	45%
	Middle	12	40%	14	45%	16	55%
	High	-----	----	-----	----	----	-------

Table (2) Growth ideal, Weight, Height, BMI- Z-Score, and BMI -Percentile (mean ± SE) for age preschool children

Parameters/ Groups	Normal (N=30)	Obesity (N=30)	Underweight (N=30)	*P* value
Growth ideal	17.2 ± 0.3	12.2±0.2	10.9±0.3	0.000 (8.85 E-28)
Weight	17.3±0.4	36.9±0.4	8.3±0.3	0.000 (1.89 E-71)
Height	99.0 ±1.2	113±0.8	95.2±1.5	0.000 (2.23 E-17)
BMI Z-Score	1.4±0.1	3.8±0.1	-12.9±1.5	0.000 (2.28 E-24)
BMI Percentile	80.8±1.8	100±0.01	0	0.000 (7.75 E-80)

Less than the 5th percentile = Underweight; 5th to less than the 85th percentile= Healthy Weight; 85th to less than the 95th percentile= Overweight; Equal to or greater than the 95th percentile= Obese; sig. (P< 0.05). Normal – 2 to + 2 SD. Tall: + 2 SD (WHO,1995)

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Table (3) Mean and percent from RDA of Macronutrients intake for normal cases, obese and underweight children (No=30/ each)

Parameters/ Groups	Normal G1	Obesity G2	Underweight G3
Macronutrients intake			
Calorie (kcal)	1248±1.4	2135±65.7	456.5±29.5
RDI	**1400 kcal**		
% from RDI	89%	153%	33%
Protein (g)	15.9±0.2	55.9±1.8	10.5±0.4
RDI	**19g**		
% from RDI	84%	294%	55%
Carbohydrate (g)	106.0±1.3	331.2±13.8	70.4±2.5
RDI	**130 g**		
% from RDI	82%	255%	54%
Fat (g)	30.3±1.2	65.4±16.8	12.5±4.0
RDI	**35g**		
% from RDI	87%	187%	36%

RDA according WHO (2004)

Table (4) Mean and percent from RDA of Micronutrients intake for normal cases, obese and underweight children (No=30/ each)

Parameters/ Groups	**Normal G1**	**Obesity G2**	**Underweight G3**
Micronutrients intake			
Iron (mg)	7.9±0.7	9.9±2.1	1.9±0.5
RDI	**10mg**		
% from RDI	79%	99%	19%
Zinc (mg)	3.7±0.5	6.7±1.5	1.3±0.6
RDI	**5mg**		
% from RDI	74%	134%	26%
Calcium (mg)	725.0±23.6	327.7±17.6	128.1±6.2
RDI	**1000mg**		
% from RDI	73%	33%	13%
Phosphorus (mg)	254.0±8.0	628.3±25.4	162.3±11.1
RDI	**500mg**		
% from RDI	51%	126%	33%
Vit D (µg)	520.0±6.2	445.0±7.7	426.7±4.6
RDI	**600 µg**		
% from RDI	87%	74%	71%

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Table (5) Diet History for all Subjects

Food and Beverage	Frequency of consumption normal (N=30)								Frequency of consumption obese (N=30)								Frequency of consumption underweight (N=30)							
	D<3	D>3	%	W<3	W>3	%	M	%	D<3	D>3	%	W<3	W>3	%	M	%	D<3	D>3	%	W<3	W>3	%	M	%
Bread	25	--	83	--	--	--	--	--	25	--	83	--	--	--	--	--	--	15	50	--	--	--	--	--
Rice	--	25	83	--	--	--	--	--	30	--	100	--	--	--	--	--	--	--	--	--	20	67	--	--
Baked	--	--	--	5	--	17	--	--	26	--	87	--	--	--	--	--	--	--	--	10	--	33	--	--
Indomie	--	--	--	5	--	17	--	--	30	--	100	--	--	--	--	--	--	--	--	27	--	90	--	--
Potatos	--	20	67	--	--	--	--	--	28	--	93	--	--	--	--	--	--	--	--	--	10	33	--	--
Potato)	--	--	--	---	--	--	--	--	--	--	--	--	--	--	5	17	--	--	--	--	--	--	--	--
Chipsey	--	--	--	15	--	50	--	--	30	--	100	--	--	--	--	--	--	--	--	27	--	90	--	--
Bean	--	--	--	10	--	33	--	--	--	--	--	10	--	33	--	--	--	--	--	10	--	33	--	--
Falafel	--	--	--	20	--	67	--	--	--	--	--	--	16	53	--	--	--	--	--	--	8	27	--	--
Lima bean	--	--	--	15	--	50	--	--	--	--	--	--	--	--	20	67	--	--	--	--	--	--	--	--
Lentil	--	--	--	--	--	--	20	67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fresh vegetables	--	25	83	--	--	--	--	--	--	--	--	--	5	17	--	--	--	--	--	--	20	67	--	--
Cooked vegetables	--	27	90	--	--	--	--	--	--	--	--	8	--	27	--	--	--	--	--	--	15	50	--	--
Fruits	26	--	87	--	--	--	--	--	10	--	33	--	--	--	--	--	10	--	33	--	--	--	--	--
Juices	--	--	--	22	--	73	--	--	--	--	--	--	16	53	--	--	--	--	--	7	--	23	--	--
Meat	--	26	87	--	--	--	--	--	--	5	17	2	--	7	23	77	--	--	--	--	8	27	--	--
Processed meat	--	--	--	--	--	--	20	67	20	--	67	--	--	--	--	--	--	19	63	--	--	--	--	--
Liver	--	--	--	20	--	67	--	--	--	--	--	--	--	--	5	17	--	--	--	--	--	--	--	--
Birds	--	18	60	--	--	--	--	--	--	--	--	4	--	13	--	--	--	--	--	8	--	27	--	--
Fish	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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High fat fish	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tilapia fish	--	24	--	80		--	--		--	--	--	--	--	--	3	--	10	--	--	--	--	--	--	--	6	--	20	--	--	--
Milk	--	25	--	83	--		--		--	--	--	--	--	--	6	--	20	--	--	--	--	--	--	--	5	--	17	--	--	--
White cheese	25		83		--	--	--	--	--	--	--	13	--	43	--	--	--	--	--	--	--	3	--	10	--	--	--	--	--	--
Triangles' cheese	--	--	--	--	--	--	--	--	--	--	25	--	83	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Yogurt	--	26	--	87		--		--	--	--	--	--	--	10	--	33	---	--	--	--	--	--	--	5	--	17	----	--	--	
Egg	25	--	83	--	--		--		--	--	--	22	--	73	--	--	--	--	15	50	--	--	--	--	--	7	--	23	--	--
Sugar		20		67	--	--	--	--	--	--	30	--	100	--	--	--	--	--	--	--	17		57	--	--	--	--	--	--	--
Dessert	--	--	--	--		15		50	--	--	29	--	87	--	--	--	--	--	--	--	--	--	--	--	6	--	20	--	--	--
Sweets	--		--		--	10	--	33	--	--	28	--	93	--	--	--	--	--	--	--	--	15	--	50	--	--	--	--	--	--
Honey	--	--	--	--	--	--	--	--	15	50	--	18	---	60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Jam	--	--	--	--	--	--	--	--	10	33	--	22	---	73	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	33
Salt	--	27	--	90	--	--	--	--	--	--	--	30	--	100	--	--	--	--	--	--	--	14	--	47	--	--	--	--	--	--
Stimulant drinks	--		--		--	10	--	33	--	--	--	25	--	83	--	--	--	--	--	--	---	17	--	57	--	--	--	--	--	--
Soft drinks		--		--	--	10	--	33	--	--	30	--	100	--	--	--	--	--	--	--	20	--	67	--	--	--	--	--	--	--
Fast food	--	--	--	--	--	--	--	--	5	17	27	--	90	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hot oil	--	--	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Corn oil	--	30	--	100	--	--	--	--	--	--	--	22	--	73	--	--	--	--	--	--	--	---	--	--	--	15	50	--	--	--
Hydrogenated oils		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

D= Daly; W= weekly and M= Monthly

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Table (6) mean of hemoglobin (Hb), TSH, T3, T4, and Vit A, and D serum for normal cases; obese and underweight children (No=30/ each)

Parameters/ Groups	Normal range	Normal/ control G1	Obesity G2	Underweight G3
Hb g/dl	11-14	12.1±0.06	10.5±0.2	9.7±0.1
% change for normal		--	-13%	-20%
TSH mIU/L	(0.4 -7.0)	3.78±0.3	3.7±0.1	2.5±0.1
% change for normal		--	-2%	-34%
T3 mIU/L	0.6-1.85	1.1±0.04	0.5±0.01	0.2±0.01
% change for normal		--	-55%	-82%
T4 mIU/L	4.8– 12.0	7.7±0.3	7.7±0.1	13.0±0.1
% change for normal		--	0 %	69%
Vit A µg/dl	11.3-64.7	35.7±2.3	9.6 ±0.2	9.5±0.2
% change for normal		--	-73%	-73%
Vit D ng/ ml	>=30	32.1±0.2	14.3±0.4	16.5±0.5
% change for normal		--	-55%	-49%

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عادات تناول الطعام وارتباطها بالسمنه ونقص الوزن لدي أطفال ما قبل المدرسة

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الملخص العربي

تظل العادات الغذائية الخاطئة مشكلة خطيرة للأطفال دون سن الخامسة. يؤدي تناول الطعام السيئ إلى سوء التغذية مما يؤدي إلى العديد من المضاعفات. تهدف هذه الدراسة إلى التعرف على نوعية النظام الغذائي لنقص الوزن والسمنة لدى بعض أطفال في سن ما قبل المدرسة. شملت الدراسة (٩٠) طفلًا في سن ما قبل المدرسة تتراوح أعمارهم بين ٢ و ٦ سنوات ، مع نمو خطي مضطرب ، تم اختيارهم عشوائيًا من العيادة الخارجيه للمعهد القومي للتغذية (NNI) و (٣٠) حالة في نفس العمر والجنس مثل المجموعة الضابطة. خضع جميع المشاركين للتقييم الأساسي (المأخوذ الغذائي بما في ذلك طريقة "الاسترجاع لمدة أربع وعشرين ساعة" و "استبيان تكرار الطعام" ؛ القياسات الأنثروبومترية بما في ذلك "الوزن والطول" ؛ الفحوصات المعملية بما في ذلك الهيموجلوبين ، TSH في الدم ، T4 ، T3 وفيتامين A ، وأظهرت النتائج أن متوسط الوزن بالنسبة لعمر Z كان أقل بشكل ملحوظ بين ناقصي الوزن وأعلى من السمنة مقارنة بالمجموعة الضابطة. أظهر تحليل المأخوذ الغذائي أن متوسط تناول جميع المغذيات الكبيرة كان الأعلى في السمنة بينما كانت المغذيات الدقيقة أقل في كليهما مجموعات سوء التغذية مقارنة مع المجموعة الضابطة. جميع قيم الدم من Hb و TSH و T3 والفيتامينات A أو D كانت أقل في النسبة المئوية بين مجموعتين من سوء التغذية والمجموعة الضابطه. T4 كانت أعلى في مجموعة نقص الوزن مقارنة بالمجموعة الأخرى. أن نقص المأخوذ الغذائي للعديد من العناصر الغذائية التي يتناولها الأطفال لسوء التغذية قد يلعب دورًا مهمًا في توزيع نموهم الخطي. يوصى باستراتيجيات الوقاية من سوء التغذية وتشجيع تناول الطعام الصحي

الكلمات المفتاحية: جوده النظام الغذائى – سوء التغذية – اطفال فى سن ما قبل المدرسة