

Dietary Habits and Serum Lipid Profile in Overweight and Obese Children

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Abstract: Background Objectives: This study was conducted to assess the correlation between the dietary Habits and Serum Lipid Profile in Overweight and Obese Children. **Methods:** In this cross sectional study, 92 Egyptian children at the pediatric endocrine and obesity outpatient clinic in Mansoura University, Children Hospital and the pediatric department of Damietta Al-Azhar University Hospital in the period from April 2017 to April 2018, they were recruited according to the inclusion and exclusion criteria. **Results:** The mean age of studied cases was 10.35 years; the age of onset of obesity ranged from birth to 13 years. The majorities of studied cases were females, had positive family history of obesity and had negative consanguinity. Regarding the anthropometric measures of studied cases, we found that the weight percentiles ranged from 59th to > 99th, while height percentile ranged from 10th to 95th; the frequency of obese children were (67.4%) higher than overweight children (32.6%). Most of the studied children were exclusively breast fed, do not eat fast foods, and the most of their food were rice and potatoes consume rice 5-6 times/week, macaroni less than once/week and potatoes 5-6 times/week. As regard proteins, most of the studied children consume meat less than once weekly, fishes and chicken 2-4 times weekly. The majorities of children consume vegetables less than once/week, eat sweets and candies more than twice daily and consume sugary juices once to twice daily. On the other hand, most of them consume milk and dairy products and raw fruits and vegetables 5-6 times/week and drink carbonated soft sodas occasionally. The majorities of them had inadequate breakfast, eating while watching TV or playing computer games. In addition, most of them do not practice routine sports. Most of them had cholesterol, HDL and LDL values within the normal range. On the other hand, about 59% of children had abnormal values of triglycerides. **Conclusion:** The age of onset of obesity ranged from birth to 13 years with a mean (5.48) years. The overweight children were older than obese children, with statistical significant difference. The prevalence of obesity in our study was higher in females (56.5%) more than males (43.5%). The obese children have more frequent consumption of carbonated soft drinks, sweets and candies and sugary juices, than overweight children with statistical significant difference. There was a close association between inadequate breakfast, eating while watching TV, eating while playing computer games, lack of practicing of routine sports and the risks of developing overweight or obesity. Most of the studied children had cholesterol, HDL and LDL values within the normal range. About 59% of children had abnormal values of triglycerides. High cholesterol values were associated with high consumption of soft drinks and lesser eating of sweets and candies with statistical significant difference. Also High LDL values were associated with excess consumption of soft drinks, moderate sugary juice consumption. Low HDL values were associated with short duration of obesity, higher BMI percentiles, and high consumption of fast foods, infrequent eating of macaroni and frequent eating of potatoes, with statistical significant difference.

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Keywords: children, obesity, overweight, dietary habits, serum lipids and triglycerides.

1. Introduction:

Obesity among children, adolescents and adults are an emergent Problem in public health. Much attention has focused on prevention, Especially during the perinatal period. In Egypt, the percentage of Overweight children aged 5–19 years old, was 35% in males and 36.4% in Females, while that of obesity was 10.5% and 9.5% respectively According to the EDHS 2014 (1).

Obesity is characterized by an excess of body fat or adiposity. It is most often defined by the body mass index (BMI), a mathematical formula of weight-for-height index. BMI is measured by dividing the body weight in kilograms to height in meters squared (kg/m²). BMI has a high correlation with adiposity and it also correlates well with excess weight at the population level (2).

The World Health Organization (WHO) reported that the global prevalence of childhood obesity has increased from 31 million to 42 million children, and increased in Africa alone from 4 to 10 million children during the period from 1990 to 2013(3). Obesity is a complex, multifactorial condition affected by genetic and non-genetic causes outlines the determinants of pediatric obesity. In children and adolescents, the overweight state is generally caused by a lack of physical activity, unhealthy eating patterns resulting in excess energy intake, or a combination of the two resulting in energy excess. Genetics and social factors (socio-economic status, race/ethnicity media and marketing and the physical environment) also influence energy consumption and expenditure (2).

Obesity is the result of an imbalance between the energy values of The food we eat and our daily energy expenditure (4).

Dietary patterns represent the combined effects of foods, and Illustrate efficaciously the impact of diet on health outcomes. Dietary Intakes during childhood may have many short- and long-term impacts on Health, including obesity risks during childhood (5).

As childhood obesity appears to track over time the impact of rising pediatric obesity rates, if left unchecked, will presumably translate to worsening rates of obesity in adulthood in the future. The rising incidence of adult obesity is clearly of concern, as obesity in adulthood is known to increase the likelihood of developing cardiovascular disease (CVD), type2 diabetes (T2D) and its associated retinal and renal complications, nonalcoholic fatty liver disease (NAFLD), asthma, obstructive sleep apnea (OSA), polycystic ovarian syndrome (PCOS), infertility, orthopedic complications, psychiatric disease, cancer and other obesity-related disorders (5).

Among the risk factors, low-density lipoprotein (LDL) cholesterol and BMI measured in childhood were found to predict IMT in young adults. In a report on the follow-up of childhood participants of the Bogalusa Heart Study as adults, children who have metabolically healthy Overweight/obesity were noted to have favorable cardio metabolic Profiles in adulthood (6).

2. Subjects and Methods

Type and Place of study:

This study was across sectional study, it was carried out at the pediatric endocrine and obesity outpatient clinic in Mansoura University Children Hospital and the pediatric department of Damietta Al-Azhar University Hospital in the period from April 2017 to April 2018.

Selection of cases:

In working days of the pediatric endocrine and obesity outpatient clinic in Mansoura University

Hospital, two days per week, any child who full filled the inclusion criteria was enrolled in the study.

Inclusion criteria:

- Children aged between (6-16) years.
- Both sexes.
- Children with body mass index (BMI) above 85th percentile.

Exclusion criteria:

- Children suspected or have known causes of obesity or chromosomal abnormalities as Prader Willi or Beckwith-Wiedemann.
- Patients on drugs that known to cause obesity as corticosteroids.

Each participant enrolled in this study was subjected to the following:

1-Detailed history taking which include:

- Name, Sex, and Age.
- Age of start obesity.
- Presenting complain.
- Symptoms that were associated with obesity as headache, dyspnea, obstructive sleep apnea and asthma.
- Full data about daily activity.
- Positive family history of obesity.
- Full dietetic history including; duration of breast or formula feeding.
- Full data about daily diet and its" main composition.

2-Thorough clinical examination.

3-Anthropometric measurements:

Weight, height estimation, Waist circumference and the body mass index were calculated according to formula BMI is the ratio of an individual"s weight in kg to height in meters squared (kg/m²).

Classification of children according to their BMI (7):

Underweight:

If their BMI is below the 5th percentile.

Normal weight:

If their BMI is at or above the 5th percentile and below the 85th percentile.

Overweight:

If their BMI is at or above the 85th percentile and below the 95th percentile.

Obese:

If their BMI is at or above the 95th percentile for their age.

4-laboratory investigation:

The results of thyroid profile, cortisol and ACTH levels were obtained from the patients" medical record.

Three milliliters of venous blood sample will be taken from each participant after 12- hour overnight fasting. The blood was put in plain tube then centrifuged at 3000 rpm for 10minutes and the clean serum was examined for:

- 1-serum cholesterol.
- 2- Triglycerides.
- 3-HDL.
- 4-LDL.

3. Results

Statistical analysis

The collected data were organized, tabulated and statistically analyzed using statistical package for social sciences (SPSS) version 19 (SPSS Inc, Chicago, USA), running on IBM compatible computer. Quantitative data were expressed as the mean \pm standard deviation (SD). Qualitative data were presented as relative frequency and percent distribution. For comparison between two groups, the

independent samples (t) test (for parametric data) or Mann-Whitney tests (for nonparametric data) were used. For comparison between categorical groups, the Chi square (X²) or Fisher's exact tests were used. For all tests, P values < 0.05 were considered significant. For all tests, P values > 0.05 were considered insignificant (8).

Cut-off values for lipid profile:

- **Cholesterol:** normal: <170 mg/dl),
- **Triglycerides:** normal values: (0-9 years: <75 mg/dl), (10-19 years: <90 mg/dl),
- **HDL:** (normal: >45 mg/dl),
- **LDL:** (normal: <110 mg/dl).

The results of this study were demonstrated in tables:

Table (1): general characteristics of the studied cases

variable	Finding
Age Mean \pm SD Range	10.35 \pm 2.5
Sex Males Females	40 (43.5%) 52 (56.5%)
Age at onset of obesity (years) Mean \pm SD Range	5.48 \pm 3.41 Birth-13 years
Duration of obesity (years) Mean \pm SD Range	4.88 \pm 2.63 2-12.5
Family history of obesity	
Yes	66 (71.7%)
No	26 (28.3%)
Consanguinity	
Yes	14 (15.2%)
No	78 (84.8%)

This table shows general characteristics of the studied cases, we found that the mean age of studied cases was 10.35 years; the age of onset of obesity

ranged from birth to 13 years. The majorities of studied cases were females, had positive family history of obesity and had negative consanguinity.

Table (2): comparison between obese and overweight children as regard to demographic data

Variables	BMI		P value
	Overweight (n= 30)	Obese (n=62)	
Age (years)	11.45 \pm 2.62	9.82 \pm 2.28	0.003*
Sex Males Females	16 (53.3%) 14 (46.7%)	24 (38.7%) 38 (61.3%)	0.27
Age at onset of obesity (years)	6.4 \pm 3.79	5.03 \pm 3.14	0.192
Duration of obesity (years)	5.05 \pm 2.34	4.79 \pm 2.77	0.167
Family history of obesity			
Yes	16 (53.3%)	50 (80.5%)	0.013*
No	14 (46.7%)	12 (19.5%)	
Feeding during infancy			
Exclusive breast feeding	29 (96.7%)	44 (71%)	0.005*
Mainly bottle feeding	1 (3.3%)	18 (29%)	

Significant:

This table shows that overweight children were older than obese children, with statistical significant

difference. On the other hand, obese children have more frequent family history of obesity and more frequent bottle feeding during infancy than overweight

with statistical significant difference and most of the obese children were female.

Table (3): comparison between obese and overweight children as regard to healthy and healthy foods.

	BMI		P Value
	Overweight (n= 30)	Obese (n=62)	
Raw Vegetables			
< once daily	17 (56.7%)	32 (51.5%)	0.179
2-4	8 (26.7%)	26 (42%)	
5-6	5 (16.6%)	4 (6.5%)	
Milk and other dairy product			
Less than once	11 (36.7%)	10 (16%)	0.085
2-4	7 (23.3%)	23 (37%)	
5-6	12 (40%)	29 (47%)	
Carbonated soft drink			
Occasional	12 (40%)	28 (45%)	0.007*
Once daily	15 (50%)	12 (19.5%)	
Twice daily	0 (0%)	8 (13%)	
> twice	3 (10%)	14 (22.5%)	
Sweets and candies			
Occasional	3 (10%)	0 (0%)	0.002*
Once daily	10 (33.3%)	7 (11%)	
Twice daily	4 (13.3%)	17 (27.5%)	
> twice	13 (40.4%)	38 (61.5%)	
Sugary juice consumption			
Occasional	4 (13.3%)	10 (16%)	0.025*
Once daily	16 (53.4%)	19 (30.5%)	
Twice daily	9 (30%)	18 (29%)	
> twice	1 (3.3%)	15 (24.5%)	

Significant:

This table shows that obese children have more frequent consumption of carbonated soft drinks, sweets and candies and sugary juices, with statistical

significant difference. On the other hand, there was no significant difference as regard raw vegetables, fruits and milk consumption.

Table (4): comparison between obese and overweight children as regard to lipid profile.

Variables	BMI		P value
	Overweight (n= 30)	Obese (n= 62)	
Cholesterol Mean \pm SD Normal High	156.03 \pm 35.9621 (70%) 9 (30%)	172.42 \pm 31.5828 (45%) 34 (55%)	0.038* 0.028*
Triglycerides			
Mean \pm SD	101.13 \pm 48.08	100.9 \pm 31.26	0.119
Normal	16 (53.3%)	22 (35.5%)	
High	14 (46.7%)	40 (64.5%)	
HDL			
Mean \pm SD	52 \pm 7.87	46.29 \pm 8.48	0.003* 0.003*
Normal	26 (86.7%)	34 (55%)	
High	4 (13.3%)	28 (45%)	
LDL Mean \pm SD Normal High	83.07 \pm 37.67 22 (73.3%) 8 (26.7%)	105.14 \pm 31.68 32 (51.5%) 30 (48.5%)	0.004* 0.047*

Significant:

This table shows that obese children have higher cholesterol, higher LDL, and lower HDL than

overweight children, with statistical significant difference. On the other hand, there was no significant difference as regard to triglycerides.

Table (5): risk factors for obesity among studied cases

	Odds ratio	95% CI		P -value
		Upper	Lower	
Infant bottle feeding	11.864	1.501	93.784	0.019*
Fast foods consumption	2.639	1.28	5.43	0.008*
Inadequate breakfasting	1.811	0.75	4.37	0.187
Frequent outdoor eating	2.239	0.914	5.49	0.078
Eating while playing games	1.132	0.446	2.872	0.795
Eating while watching TV	1.567	0.602	4.076	0.357
Lack of routine sports	1.515	0.543	4.225	0.427
Sugary juice consumption	1.547	0.955	2.507	0.077
Poor raw fruits consumption	1.053	0.505	2.196	0.89
Poor milk consumption	1.542	0.888	2.679	0.124
Frequent carbonated soft drinks	1.318	0.871	1.996	0.192
Sweets,candies and etc	2.15	1.286	3.595	0.003*

Significant:

Bottle feeding, fast foods consumption and sweets, candies and etc. have significant effect on the childhood obesity.

4. Discussion

The most important cardiovascular risk factors in children and adolescence have been identified as obesity, smoking, dyslipidemia, high blood pressure, and reduced physical activity (10). Co-relationships in several populations are well established between risks of coronary arterial disease (CAD) and high blood concentrations of total cholesterol (TC), especially low-density lipoproteins (LDL-c), and reduced high density lipoproteins (HDL-c) (11).

The purpose of this study was to evaluate dietary habits and serum lipid profile among overweight and obese children.

Regarding gender, the prevalence of obesity in our study was higher in females (56.5%) more than males (43.5%). Similar finding was conducted by **Raja'a and Bin- Mohanna, (2005) (12)** reported that prevalence of overweight and obesity was higher among females more than males. In contrary to **Zoair et al., (2013) (13)** revealed that there was no significant difference between gender and obesity.

The risk of developing obesity in our study in children with negative family history of obesity was 28.3 % while that risk was increased in positive Family history of obesity (71.7 %). Similar finding was found in a study conducted on children aged 3-5 year olds with parents of normal weight have a 24% chance of becoming obese later on in life, having one parent that is obese brings this risk factor up to 62%. The possible risk increases even more in the 10-14 age group, reaching 64% and 79%, respectively (10). Also, The risk of developing obesity in children with parents of normal weight has been accepted to be 10%, 40% when one parent is obese, and 80% when both parents

are obese (14). As regard proteins, most of the studied children consume meat less than once weekly, fishes and chicken 2-4 times weekly. In our study the obese children have more frequent consumption of carbonated soft drinks, sweets and candies and sugary juices, than overweight children with statistical significant difference. Similarly a study by (15) showed that children who were overweight or obese were considerably more likely to engage in unhealthy eating behaviors. On investigating the lipid profile among studied cases; we found that most of them had cholesterol, HDL and LDL values within the normal range. On the other hand, about 59% of children had abnormal values of triglycerides.

Similar finding was conducted when cholesterol levels are evaluated in overweight and obese children by age group, some studies show that these values do not change until puberty but then show a decrease in both genders at puberty, particularly in males, ultimately rising after puberty (16, 17).

Conclusion:

The age of onset of obesity ranged from birth to 13 years with a mean (5.48) years. The overweight children were older than obese children, with statistical significant difference.

The prevalence of obesity in our study was higher in females (56.5%) more than males (43.5%).

The obese children have more frequent consumption of carbonated soft drinks, sweets and candies and sugary juices, than overweight children with statistical significant difference.

There was a close association between inadequate breakfast, eating while watching TV, eating while playing computer games, lack of practicing of routine sports and the risks of developing overweight or obesity.

Most of the studied children had cholesterol, HDL and LDL values within the normal range. About 59% of children had abnormal values of triglycerides.

High cholesterol values were associated with high consumption of soft drinks and lesser eating of sweets and candies with statistical significant difference. Also High LDL values were associated with excess consumption of soft drinks, moderate sugary juice consumption. Low HDL values were associated with short duration of obesity, higher BMI percentiles, and high consumption of fast foods, infrequent eating of macaroni and frequent eating of potatoes, with statistical significant difference.

Recommendations

Nutritional habits formed at early ages later become risk factors for many medical conditions in adulthood.

Monitoring cholesterol, LDL and HDL levels in childhood medical examinations is not only important in terms of identifying obesity, but also in identifying nutritional mistakes and deficiencies at an early age.

Removing TV sets from bedrooms and limiting TV viewing time may be a protective precaution that families can take.

At the same time, a regular exercise program designed for children will serve as a first-step precaution and a way of more easily dealing with the issue of overweight and obesity.

Replacing fructose-containing beverages with healthier alternatives such as water would be an important strategy in the battle of the bulge and its cardiometabolic consequences.

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