The Prevalence of Obesity and Its Relation to Physical Activity and Dietary Patterns among Female High School Students of Tehran, Iran

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Abstract

Objective: There are many causes for obesity; inappropriate dietary patterns, inadequate physical activity, and lethargic lifestyle can be mentioned as the main and most important of these causes. Due to the increasing prevalence of obesity in society, it seems necessary to study its causes and find ways to tackle this problem.

Materials and Methods: This descriptive-analytical study was conducted on 380 female high school students from district 5 of Tehran, Iran, in 2012. In this research, physical activity was measured using the International Physical Activity Questionnaire (IPAQ), and dietary pattern was measured using the Food Frequency Questionnaire (FFQ). Body mass index (BMI) was also calculated. In addition, for measurement of aerobic and anaerobic powers, the 540-meter sprint and vertical jump test (Sargent Jump Test) were applied. Gathered data was analyzed using SPSS software.

Results: The findings of the present study show that 24.7% of the population was overweight and obese, 67% of normal weight (natural), and 8.2% underweight (thin). Chi-square test on breakfast and classification of weight (r = -0.285 and P = 0.002) showed a negative relationship between obesity and eating breakfast. Moreover, it showed a significant positive correlation between watching television and working on the computer, and obesity.

Conclusion: According to the results of this research, there is a positive and direct relationship between obesity and lack of exercise and fast food intake (P < 0.05). There is also a positive and direct relationship between physical fitness, and amount of physical activity and fruit and vegetables intake (P < 0.05). The highest rates of overweight and obesity were observed in 17 year olds.

Keywords: Diet, Obesity, Physical Activity

Introduction

In recent decades, due to economic and socialprogress and the increased public knowledge investigating the epidemiology of diseases and their causes, and methods to prevent and overcome them have gained importance. Due to its accelerated growth rate, obesity has been named the epidemic phenomenon of the century (1). There has been a twofold increase in obesity compared to the previous decade. From every 5 children, one child is obese, and 60% of children are overweight (2). The World Health Organization (WHO) has declared that

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11.1 million people worldwide are obese and overweight, and 25 million of them are Iranian. In Iran, 60% of people over 20 years of age are obese and overweight. In addition, 12 to 18% of Iranian adolescents are overweight and 6.5% of them are obese (3). Obesity occurs due to several factors; among these are sedentary lifestyle, lack of exercise, poor diet, non-standard living and working conditions, stress, and hereditary factors. Obesity is associated with various diseases such as hypothalamic-pituitary disorders, adrenal hyperfunction, hypothyroidism, type 2 diabetes, gonadal function, metabolic and hormonal disorders, and cardiovascular and respiratory diseases, and affects the general health status in the society (3,4). Obesity is also directly related to atherosclerosis (5).

In 1997, the World Health Organization (WHO) proclaimed obesity to be an epidemic and a major cause of health problems (6). The health of women and girls is of great importance and should be examined, since they are a large and influential part of any community. Changing dietary intake in conjunction with physical activity is an appropriate and cost-effective method to combat obesity. Previous research has shown factors affective on the rate of obesity in girls to be patterns of physical activity, dietary patterns, behavioral factors, family-related factors, cultural and economic factors, parents' physical activity, and genetic, metabolic, and hormonal factors (4). One of the fundamental causes of obesity is imbalance between the amount of consumed and metabolized calories. Often, the amount of calorie intake is greater than the amount of calories metabolized and needed. Therefore, excess calories are stored as fat in the body which can, over time, lead to obesity (7). Research has shown that if both parents are obese, the risk of obesity in children will probably be 66 to 80%. If only one parent is obese, the risk of obesity in children will be 40% to 50% and if none of the parents are obese, the likelihood of obesity in children will be only 9% (8). This indicates the importance of parental health and its impact on children's health.

The body needs energy in order to survive. This energy is obtained from 3 main nutritional groups; carbohydrates, proteins, and fats. Imbalance between the body's energy intake and energy expenditure leads to the storage of excess calories as fat in the body (9). Obesity also causes some hormonal abnormalities such as increased production of cortisol, increased resistance to insulin (hyper insulinism), decreased sex hormone-binding globulin (SHBG) in women, decreased levels of progesterone in women and testosterone in men, reduced production of growth hormone, and increased blood leptin (7).

Regular exercise results in reduced severity and symptoms of cardiovascular disease, hypertension, type 2 diabetes, obesity, colon cancer, breast cancer, psychiatric illnesses, and anxiety. The duration of exercise is dependent on individual physical strength, age, gender, health status, and genetic and personal factors (10). Exercise and physical activity have an effect on fat tissues and can have a direct impact on reducing fat storage cells. Fat stored in lipocytes will lead to weight gain and obesity (11). Among the many beneficial outcomes of physical activity is that it causes health improvement. Weight control has psychological and social effects such as an increased feeling of self-worth, elimination of tension, creation of self-confidence and strong will, and increase focus. It also has physiological effects on individuals such as maintaining and controlling weight, controlling appetite, and maintaining balance between energy intake and energy expenditure (12,13). Given the importance of health among young girls due to maintaining the health of the entire community, this study aimed to examine the prevalence of obesity and its relationship with physical activity and dietary patterns in female high school students from district 5 of Tehran, Iran.

Materials and Methods
This was a cross-sectional study. The study population included 380 female high school students (in first, second, and third grades) from district 5 of Tehran. The subjects were selected randomly. The mean age of the population was 16.05 ± 0.5 years, height 1.6254 ± 0.06946m, weight 61.5464 ± 12.22853kg, and body mass index (BMI) 22.2608 ± 4.16787 (weight in kilograms divided by square of height in meters). After selecting the subjects, the International Physical Activity Questionnaire (IPAQ), Food Frequency Questionnaire (FFQ), and consent form to participate in the study were completed by the subjects. The BMI of the subjects was calculated using standard scales and a standard meter. Then, in terms of BMI, the participants were divided into 4 groups; slim (BMI < 18.5), normal ($18.5 \leq$ BMI < 25), more than normal (overweight) ($25 \leq$ BMI < 29.9), and obese (BMI $\geq$ 30) (7). The IPAQ includes 7 questions. It determines the number of days that the subjects had severe physical activity (in terms of minutes and the number of days per week), moderate physical activity (in terms of minutes and the number of days per week), light physical activity such as walking for at least 10 minutes (based on duration per minute), and did not have any activity such as sitting (based on minutes). The method of scoring the questionnaire is as follows:

(Duration of activity per day in minutes × number of active days in a week) / 7.

Statistical analysis
The FFQ consisted of multiple pages and 91 different food items. It determined the amount of each food item consumed by the subjects each day, week, month, and year. Some of these food items included meat, poultry, fish, eggs, sausages and salami, milk, yogurt, and other dairy products, and fruits and vegetables. After data collection, the obtained data

were coded and analyzed using SPSS software (version 16, SPSS Inc., Chicago, IL, USA).

Results

Mean and standard deviation of height, weight, and BMI, based on the age of the participants, are presented in table 1. Findings of the present study suggested that the prevalence of overweight and obesity among female high school students in Tehran was 24.7%. Moreover, 67% of students had normal weight and 8.2% had low weight (lean). The results of this study showed that 22.9% of 15 year old girls were overweight and obese, and 71.4% had normal weight and 5.7% low weight (lean). Furthermore, 25% of 16 year old girls were overweight and obese, and 68.8% had normal weight and 6.2% low weight (lean). Among 17 year old students, 26.7% were overweight and obese, and 60% had normal weight and 13.3% had low weight (lean). In general, the highest rates of overweight and obesity were observed in 17 year old students. Based on chi-square test on the relationship between eating breakfast and classification of weight (r = -0.285), there was a significant negative relationship between eating breakfast and obese subjects. There was also a significant positive correlation between the duration of watching television and working with computers and obesity. No significant relationship was found between physical activity (light, moderate, or severe) and sedentary behavior in subjects with lean BMI and subjects with normal weight (P > 0.05). However, in obese subjects, there was a significant positive relationship between physical activity (light, moderate, and severe), and sedentary behavior and body mass index (P < 0.05). The relationship between dietary patterns and BMI in all the subjects was positive and significant, except for the food items of dairy products, legumes, whole grains, and fat liquids (P < 0.05).

Discussion

Today, the growing worldwide rate of obesity threatens the health of communities. The results of this study showed that the rate of overweight and obesity was 24.7%, normal weight was 67%, and low weight (lean) was 8.2% among female high school students of Tehran. The highest rate of overweight and obesity was observed among 17 year old students. The rate of obesity is widely increasing. In addition to genetic factors, other important factors such as physical activity, and economic, cultural, and nutritional factors influence the prevalence of obesity. In other researches the prevalence of overweight and obesity among African-American children was reported as 49.2 and 44%, and among Hispanic and Latin-American children as 32.2% (14). Other statistical results showed higher rates compared to the present study results. Zephier et al. conducted a research on 12,559 children of 5 to 17 years and examined the prevalence of overweight and obesity related to age. The results of their study showed a 39% rate of obesity and overweight among girls and boys, and the prevalence of obesity was higher in boys than in girls (15). The lowest prevalence of obesity and overweight was observed in Lithuania (5.1% and 0.4%) and Latvia (5.9% and 0.5%), respectively (14). Physical inactivity, working with computers, and the duration of watching television had a significant positive relationship with obesity rates (P < 0.05). In other researches, black British students showed more sedentary behavior than white British students, and the sedentary behavior was more in response to the low economic and social conditions. The superlative prevalence of physical inactivity was observed during the ages of 11 and 12 years and 15 to 16 years (14). The results of this study showed that there was a significant positive relationship between obesity and nutritional patterns of the subjects (P < 0.05). Furthermore, there was a significant negative relationship between obesity and eating breakfast. Eating breakfast makes people feel less hungry throughout the day, and thus, they will have more ability to control their food intake. In Spain, the consumption of fast foods has increased weight and obesity by 49%, and daily caloric intake in those groups who are overweight is significant (16,17).

Conclusion

Due to the fact that obesity is a widespread public health concern and its rate is increasing very rapidly, solutions should be determined for its elimination and prevention. Changing nutritional patterns and physical activity patterns is a suitable solution and worthy of attention. It is vital that these changes be carried out in the early years of life within the family. Weight gain is the major cause of many diseases and by controlling it diseases can be fought and greater longevity and better physical health can be achieved.

Table 1. Descriptive indicators of the variables of height, weight, and body mass index of participants by age

Age (year)		Height (m)	Weight (kg)	Body mass index
15	Mean ± SD	1.6231 ± 0.07451	61.2571 ± 12.47902	23.2106 ± 4.04372
	Lowest-highest	1.49-1.80	42-115	17.02-38.90
16	Mean ± SD	1.6109 ± 0.06654	60.0625 ± 9.44231	23.0803 ± 3.61128
	Lowest-highest	1.50-1.75	43-78	17.90-31.25
17	Mean ± SD	1.6433 ± 0.06451	63.4667 ± 14.51868	23.5120 ± 4.92833
	Lowest-highest	1.49-1.76	42-115	16.18-38.90
Total	Mean ± SD	1.6254 ± 0.06946	61.5464 ± 12.22853	23.2608 ± 4.16787
	Lowest-highest	1.49-1.80	42-115	16.18-38.90

Ethical issues

This study was approved by the Ethics Committee of Islamic Azad University, Science and Research Branch of Rasht, Iran, and written consents were obtained from all the participants.

Conflict of interests

We declare that we have no conflict of interests.

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