Original Article   **Open Access**

How participating in the Scientific Olympiad event affected the obesity of Iranian male students

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Abstract

Introduction: Obesity is known as a chronic disease with increased body fat reserves. The prevalence of obesity in young people is increasing. This study was conducted to investigate the obesity status among students participating in the Science Olympiad in different provinces of Iran.

Methods: The present study was a descriptive-analytical study that was conducted on 92 teenage boys who participated in the Scientific Olympiad. Sampling was done by the available and purpose-based methods. Data collection was done through a researcher-made questionnaire including personal information and physical information. Physical data included height, weight, body mass index, body fat percentage, and waist and hip circumference measurements (WHR), which were measured and recorded by a researcher. The results were compared using SPSS20 via descriptive and inferential statistical tests.

Result: The results of the study showed that the majority of participants in the Olympiad were in high school and had participated in the Olympiad for the first time. The average body mass index (BMI) of Olympiad students in the provinces of the country was within the normal range. The results of the body mass index (BMI) and WHR results showed that there was a significant difference between the 5 separate observation provinces (p=0.028 and p=0.018, respectively). But in the examination of body fat percentage, the results showed that there is no significant difference between the 5 separated provinces.(p>0.05)

Conclusion: The results of the present study showed that the average body mass index of adolescent boys in eastern Iran is higher than in other provinces. Also, the WHR of boys in the south is higher than in other provinces. Therefore, it seems necessary to pay attention to and prevent obesity in these areas.

Keywords: Obesity, overweight, Adolescent

Introduction

Obesity is known as a chronic disease with increased body fat reserves[1]. Also, it considers a multifactorial and complex disease that includes the interaction between genetic, hormonal, behavioral, economic, and environmental conditions[2]. Being overweight and obese are considered risk factors. The main disease is several chronic diseases, including cardiovascular diseases and stroke, which are the most important causes of death all over the world[3]. Excess weight can also lead to diabetes and related diseases such as blindness, amputation, and the need for dialysis[4] Carrying too much weight can lead to skeletal-muscular disorders including arthritis[5].

Obesity is caused by various reasons such as lack of physical activity, non-observance of nutrition and diet, heredity, environment, and other factors[6]. It is known that one of the causes of obesity can be heredity. In obese people, genetic defects and different types of DNA sequences directly. The accumulation of fat is associated[7]. The first monogenic defect caused by obesity was described in 1997, and until today, about

20 monogenic defects have been identified. It has been established that it leads to obesity[8]. On the other hand, hormonal problems can be another cause of obesity. Changes The function of hormones can cause different diseases in a person, one of these diseases is obesity. These problems include hypothyroidism, Cushing's disease, hypogonadism, and growth hormone deficiency[9]. inactivity and non-observance of diet also with the increase in obesity is evident. Increasingly, the role of the environment is recognized as an important factor in the epidemic.

With the mechanization of living, lack of physical activity, and Failure to pay attention to nutritional recommendations, the prevalence of obesity and overweight in the world is increasing[10]. According to the latest WHO report on its official website in 2016, more than 1.9 billion adults aged 18 and above were overweight, of which more than 650 million people were in the group of obese. According to the last statistic, 61.6% of Iranian adults (57.7% of men and 65.4% of women were obese[11]. The worldwide prevalence of obesity between 1975 and 2016 approximately tripled. It is estimated that at least 2.8 million people die annually due to overweight or obese. 35.8 million people[10] Moreover,2.3% of global DALYs are due to overweight or obesity. DALY means years of life lost due to premature death and disability. The alarming results of recent studies have shown that the prevalence of obesity in young people is increasing[11].

Adolescence are the most critical periods when lifelong habits are acquired. Recently studies has shown that despite unhealthy foods and computer games, the amount of physical activity and commitment to consuming healthy foods among teenagers is greatly reduced which leads to obesity at a young age[12]. According to Who reports, only one-fifth of teenagers obey its recommendation to have at least 60 minutes of physical activity per day[13].

Sedentary behaviors including screen-based work (such as computers, televisions, and telephones) are also strongly associated with obesity and physical and mental health consequences[14]. Analysis of the International Obesity Working Group (IOTF) Showed that Worldwide, nearly 1 billion people are overweight and 457 million people are obese. Meanwhile, 200 million School teenagers were overweight and 50 million were obese[15]. Adolescent obesity is an epidemic. It has become a global issue and the World Health Organization considered it as one of the most serious public health challenges in the 21st century[16].

Has shown that there is a deep connection between obesity in adolescents and obesity in adulthood in the same people. Studies show the literature showed that overweight and obese children and adolescents are more likely to be obese in adulthood[18] Along with this result, the result of the longitudinal study of BMI in children and adolescents confirmed this result[19]. It also seems that obesity at a young age can lead to many side effects at an older age[20] The theory of prevention is better than treatment, has recently been proposed in the studies of identifying obesity among teenagers. It seems that identifying obesity in children and adolescents at a young age and providing effective solutions can prevent obesity in adulthood. Almutairi et al conducted a study to determine the risk factor of overweight and obesity among school-age children, they identified that one of the major risk factors was the sedentary lifestyle that participating in entrance exams or the Olympiad place them in this category[21]. Considering the significant complications of obesity and its relationship with adulthood, it seems that identifying obesity at a young age can be one of the most necessary strategies to prevent the complications of obesity in adults. Therefore, the present study conducted to evaluate the status of obesity among students who participated in the scientific Olympiad in Iran's provinces.

Methods

The current study was a descriptive-analytical study of applied type, which was conducted on 92 teenage boys who participated in the Scientific Olympiad. The research community included male students who had participated in the Olympiad in 1400-1401. The sample recruitment

Was done in an accessible and goal-based way. At first, the sampling frame which was a list including the demographic characteristics and phone numbers of participants was obtained. Data collection tools include the Seca scale -made in Germany- to measure weight and height, the Inbody device -to measure body fat percentage-, and tape to measure the waist and hips circumstance.

After the Ministry of Education obtained the consent of Olympiad students to share their contact numbers, necessary arrangements were made to implement the study, and sampling was started. Since the information from 5 provinces was complete and they had the most participants, sampling was done in these selected provinces. After Obtaining the names and contact numbers of the students, the researcher made the necessary arrangements with them during the phone call and told them the objectives and method of the research. Out of 170 contacts made, 92 people expressed their willingness to participate in the study.

For evaluating the research variables, i.e. height, weight, body mass index, body fat percentage, and waist and hip circumference, each of the students have to refer to a specific place in the province where the researcher or his colleagues was presented

In order to receive the same standard measurement, participants were asked to stand completely straight while they were whiteout shoes, and the heels, hips, shoulders, and back of the head were in contact with a calibrated vertical ruler. At the end of his exhalation, their height was recorded in centimeters from the graduated ruler of the device. Also, the subject's weight was determined and recorded in kilograms by the device. To obtain the body mass index, the following formula was used, and for more accuracy, the Harris Brandick software was used.

$$BMI = \frac{وزن \ (kg)}{قد \ (m)^2}$$

To measure body fat percentage, Inbody was used. This device is used to measure the percent
Body fat with the bioelectrical impedance method. The participants were asked to have a minimum of clothes and don't have any place metal objects with them. Subjects were asked to touch their palms, fingers, and the entire surface of their soles with a little moistened water. They should place the soles of their feet on the foot electrodes and take the Deceptive electrodes to the Deceptive. Correct handling of manual electrodes was controlled for each subject. by selecting the input key, the body composition device automatically measured the results and verified them. To measure the ratio of waist circumference to age (WHR), the participants stood straight without any shrinkage. Then, the widest part of the hips was measured with a tape measure. Then, the following formula was used to obtain the WHR:

$$WHR = \frac{waist \ circumstance}{Hip \ circumstance}$$

Result:

Table 1 shows the individual characteristics of the participants in the research according to the provinces of the country in the form of North, South, East, West, and Central. The results of the above table show that the individual characteristics of the students in terms of age, educational level, and level of participation in the Olympiad are not statistically significantly different from each other (in all cases P>0.05). Irrespective of the province, most of the participants in this study were in high school (61%) and it was their first time to participate in the Olympiad. Although the average age of students in southern and central provinces was less than in the other provinces, but the independent t-test didn't show a significant difference between the groups (P>0.05).

Table 1. The participant characteristics according to the provinces of the country

variable	Province	The North provinces	The Southern provinces	The East provinces	The west provinces	The central provinces	p-value
		Number (percent)	Number (percent)	Number (percent)	Number (percent)	Number (percent)	
Grade							
	Middle school	9 (37/5)	4(28.6)	6(35.3)	8(47.05)	9(45)	0.22*
	High school	15(62.5)	10(71.4)	11(64.7)	9(52.94)	11(52)	
Times of participation in the Olympiad							
	once	17(70.8)	12(85.71)	14(82.35)	11(64. 7)	15(75)	0.04*
	Twice and more	7(29.1)	2(14.29)	3(17.65)	6(35.3)	5(25)	
Age of participants		Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	0.11**
		13/87± 2.5	12.1 ±1.8	13/21 ±2.6	13/65±3.1	12.4 ±2.4	

*Chi-2
**Independent t- test

Table 2. The mean and standard deviation of BMI, WHR and fat distribution among participants

Provinces	BMI	WHR	Body Fat Percent
The North provinces	22/2±4/15	0/86±0/82	18/23±6/09
The South provinces	22/2±5/19	0/88±0/78	18/78±4/89
The East provinces	24/1±3/22	0/88±0/82	21/08±5/61
The West provinces	23/2±6/00	0/87±0/85	19/91±5/68
The Central provinces	23/1±3/13	0/88±0/78	21/40±5/47
Statistical test amount	1/28	4	1.23
p-value*	0.028	0.018	0.33

Discussion

Obesity is considered one of the main public health concerns and the fifth leading cause of death worldwide. Overweight as well as obesity considere as the main lifestyle diseases that lead to more worries. It improves health and helps many chronic diseases such as cancer, diabetes, metabolic syndrome, and cardiovascular diseases. The results of the present study showed that the average body mass index (BMI) of teenage boys who participated in the Olympiad was within the normal range. Also, in the body fat percentage section, the results showed that there is no significant difference between the 5 separated provinces. Along with our study result, Almutairi et al.'s study investigated the anthropometric characteristics of young male athletes participating in the Student Olympiad. This study reported that 840 male student-athletes who participated in the Sports Olympiad of Medical Sciences Universities had a normal body mass index[21].

In the present study, it was found that the participants in the east of the country have a higher BMI than the other provinces. In relation to WHR, the results of the present study showed that in the southern, eastern, and central provinces, t was more than in other sections. In this regard, Yamamoto et al, Khazaei et al, Maitiniyazi et al, and Frank et al confirmed that obesity across genders and ethnicities is different[22-27]. In the present study, obesity was more in the eastern region of Iran. So, it can be stated, in addition to the genetic factors, the physical activity level, and the lifestyle of these people must be considered in interpretation consideration. Therefore, the researchers of the present study recommend conducting studies with these goals.

In the present study, the BMI index was used to check obesity in adolescents and showed significant results

(P < 0.05) Several studies showed that the use of BMI can be a low-cost and practical way to identify obesity at a young age which can be spread in schools or among families[29-30]. Therefore, the researchers of the study suggest that the BMI index is an important and available tool to assess obesity in adolescents and schools.

Regarding body fat percentage and obesity, the present study showed that a statistically significant relationship was found between body fat percentage and obesity. (P < 0.05) Despite this, various studies showed that one of the best methods for identifying obesity can be the body fat percentage[31,32]. Also, other studies stated that the measurement of body fat percentage using the INBODY device can be a suitable predictive index for evaluating obesity or weight gain at young ages[33-37]. Studies conducted by Ripka and Marinov showed that the use of body fat percentage cannot be a suitable measure of obesity. The use of advanced devices should be included in the agenda. These researchers acknowledged that the accuracy of related devices is not enough to measure the percentage of body fat[38,39] due to the contradictions regarding the relationship between the index of body fat percentage and obesity, the researchers of the present study need more findings for suggesting this indicator.

We also used WHR to evaluate obesity, and it gave significant results with obesity (P < 0.05). This study result was consistent with similar studies which declared abdominal obesity as an important issue that strongly relates to cardiovascular and metabolic diseases[40]. Also, the study of Schneider et al showed that in comparison with BMI, waist circumference (WC), ratio of waist circumference to height (WHR), and ratio of waist circumference to age (WHR), is the best predictor of obesity and mortality risk[41]. Also, the study of Pischon et al. showed that the measurement of liposuction provides a better assessment of the risk of death among people with a lower BMI[42]. it can be said that the WHR index evaluates abdominal obesity at a young age and can be a good indicator for evaluating obesity and preventing cardiovascular diseases in this age group.

Conclusion

The results of the present study showed that the BMI of adolescents who participated in the Olympiad in the eastern western provinces of is higher than the other provinces. Therefore, it is necessary to pay attention to and monitor obesity in these areas. Also, the current study showed that adolescents in the east of Iran tend to be more overweight than the other parts. Therefore, the follow-up of health plans and monitoring of diseases related to obesity in these areas should be considered.

Research highlight

What we know?
Obesity is known as a chronic disease with increased body fat reserves. The prevalence of obesity in young people is increasing. it assumes that adolescents who participate in scientific events suffer from obesity more than others.

What does the research add?
This study was conducted among adolescents who participated in the scientific Olympiad and showed that in some regions of Iran, adolescents suffer from obesity more than others. This study also uses 2 low-cost and practical tests (body waist circumference measurement, and waist circumference (WHR)). These two indicators can be supervised by medical instructors at school or at home by parents for prevention and follow-up of obesity.

Conflict of interest
We didn't have any conflict of interest.

Ethical Approval
Patient data are permitted to be used in a scientific study.

Funding/ Support
Noun.

Authors' Contributions
Shahidi and salehpour : study design, search strategy, data analysis, preparing the draft
roostaei: study design, data collection, project supervision, revising and editing the manuscript.
All the authors read and approved the final manuscript.

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