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Research Article

**AN INVESTIGATION OF PREVALENCE OF OBESITY AND ITS
RELATED DEMOGRAPHIC FACTORS IN STUDENTS AGED 12-16
YEARS OLD IN AHVAZ IN 2017****Poorya Darabiyan¹, Shahram Baraz^{*2}, Nasrin Elahi², Mojtaba Miladinia³, Bayan
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Ahvaz, Iran³Bostan Nursing Faculty, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran⁴BSc, Student Research Committee, Dezful University of Medical Sciences, Dezful, Iran⁵MSc of Biostatistics, Department of Health, Faculty of Medical Science of Shoushtar, Shoushtar, Iran**Abstract:**

Introduction: Considering the prevalence of obesity among children and adolescents as a serious problem in societies, especially in developed countries, based on the research, various factors affect the prevalence of obesity. Recognizing these factors which can help control obesity in communities is of grave importance. Therefore, the present study was conducted to determine the prevalence of obesity and its related demographic factors in students aged 12-16 years old in Ahwaz in 2017.

Methodology: In order to conduct this descriptive cross-sectional study, 239 students aged 12-16 years old from middle schools of district 4 of Ahwaz were selected using cluster sampling. Their height and weight was measured using standard methods and BMI percentile was calculated based on CDC 2000 reference. A questionnaire consisting demographic data of the students was completed for each of them. Data were analyzed using SPSS software version 16, one-way ANOVA, t-test and Pearson correlation coefficient.

Findings: The prevalence of obesity and overweight was 18.8% and 22.2%, respectively. The prevalence of obesity and overweight among males was 25.6% and 17.4%, respectively and among females 11.9% and 27.1% respectively. The mean BMI for the total population (22.4±41.95) was estimated. There was a significant statistical difference between the mean weight and height of male and female students (05/0>P). Also, there was a significant statistical relationship between father's occupation and weight and BMI of the students (05/0>P).

Results: The results showed that the prevalence of obesity and overweight among middle school students in Ahwaz is relatively high and therefore, as a major health concern, in order to control obesity and overweight, schools and students' parents should be provided with educational interventions and health care plans.

Key words: Obesity, BMI, Ahwaz.

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INTRODUCTION:

Obesity is a serious health concern worldwide, and it has increased dramatically in the past few years (1,2). Increasing the urbanization and industrialization of most countries and changes in lifestyle and eating habits have led to an increase in obesity and overweight in developed and developing countries, insofar as the World Health Organization considers obesity as an epidemic (3,4). Obesity is the abnormal accumulation of adipose tissue in all or parts of the body's organs, which results from calorie intakes in excess of the body's need (5). Obesity is a chronic and multifactorial disease that is highly related to genetics. However, the prevalence of obesity around the world is also indicative of the severe effects of environmental factors on it (6). Various studies have shown the importance of heredity regarding obesity, to the extent that the results of studies suggest that if one of the parents is obese, the risk of obesity in children is increased by 40% and if both parents have this problem, the risk will increase by 80% (7,8). The socio-economic status, gender, marital status, educational level, physical activities, smoking and alcohol, place of residence, behavioral and psychological factors are among the factors affecting obesity (9). Among the complications of obesity, one can mention type two diabetes, hypertension, infertility, articular diseases, increased blood lipids, some types of cancers, cardiovascular diseases, fatty liver, polycystic ovarian syndrome and asthma (10, 11, 12,13,14). Concerning health, adolescence, on the other hand, is a very important stage, since many positive and negative health habits and behaviors are formed at this stage of life and have significant impacts on health in adulthood (15). Being overweight during adolescence is a crucial and determining factor in becoming obese and overweight in adulthood and there is a direct relationship between childhood, adolescence and adulthood obesity, and according to studies consequently, 70 to 80% of obese adolescents become obese adults (16,17).

Considering the importance of obesity among children and adolescents, numerous studies have been conducted in Iran and the world in this regard. In a study between 2000 and 2004 in the United States, the prevalence of girls' obesity increased from 13.8% to 16% and boys' obesity from 14% to 16.2% (18). A study was also conducted between 1999 and 2010 in the United States by which the prevalence of obesity in children and adolescents was estimated to be 16.9% (19). A study conducting between 2010 and 2012 aimed at assessing the prevalence of obesity and its associated factors in Chongqing, China, where overweight and obesity were common among

students, and hence overweight and obesity in high school students of Chongqing was 7.82% and 1.72%, respectively (20). A study was conducted at University of GITAM in India between 2013 and 2014 to determine the prevalence of obesity and overweight and its related factors among students, which reported an overweight and obesity rate of 26.8% and 37.5% respectively (21). Findings in our country also indicate a growing trend of overweight and obesity in Iranian children and adolescents. In the study of Mostafavi *et al.* (2005), the prevalence of obesity and overweight among students aged 13 to 18 years in Shiraz was 11.3% and 2.9% respectively (22). Kelishadi *et al.* conducting a study on 2111 children and adolescents aged 6 to 18 from 23 provinces, reported an overweight and obesity prevalence of 8.8% and 4.5%, respectively, suggesting that the obesity among girls and boys had an almost equal outbreak (23). Although there are more complex methods, such as imaging for the diagnosis of obesity, anthropometric measurements remain important, including simple methods such as waist Circumference (WC), waist-to-hip ratio (WHR) and BMI as the most valid method (24,25,26). Since overweight and obesity are risk factors associated with many other diseases and due to the increasing prevalence of obesity and overweight in adolescents, this study examines the prevalence of obesity and overweight and identifies some of the related demographic factors associated with it.

METHODOLOGY:

This descriptive cross-sectional study was conducted to determine the prevalence of obesity and overweight and identify some of its related demographic factors in public middle schools in District 4 of Ahvaz. The sample size in the study was determined using previous studies and the formula
$$\frac{(Z_{1-\alpha/2})^2 P(1-P)}{(d)^2} = \frac{(1.96)^2 0.32(1-0.32)}{(0.06)^2} =$$

232 of the students. The sampling method was cluster sampling. So, this way firstly a list of the middle schools of Ahvaz was prepared from the General Education Department. Of which, 6 schools were randomly selected. The preferred number of students for each school was randomly selected from attendance lists.

In order to comply with ethical principles, the research permit was issued from the Ahvaz Jundishapur University of Medical Sciences Ethics Committee (Ethical code: IR.AJUMS.REC.1395.350).

A number of classes were selected randomly from each school and, after obtaining the necessary permissions from the General Education Department

and coordinating with the corresponding principal, the researchers collected samples attending the schools. At first, the students were informed about the research's procedures and the purpose of doing it, and then they participated in the study willingly. The requirements for entering the study were to not have mental and physical disability and chronic illness. After distributing the demographic information questionnaire, which included: Age, gender, father's occupation, number of family members, which child is s/he in the family (i.e. how many older siblings does s/he have?), the overall grade average (OGA), height and weight were also measured. Weight measurement with the fewest clothes on and without shoes was performed using the SECA scale with a precision of 0.1 Kg. The student's height is calculated by means of a non-resilient strip meter in standing posture with no shoes on. For this measurement the feet are together and knees, pelvis, shoulders, and behind the head are positioned along a vertical line and head is right up straight in a way that the participant is looking straight. In order to avoid the observer error, height and weight of students were measured by one person. Using formula $\text{weight(Kg)} / \text{height}^2(\text{height})$, BMI was measured after having determined the height and weight of the students. After completing the questionnaires by students and measuring their height and weight, those whose fathers were deceased or retired were excluded from the study. The height and weight of individuals were divided according to the BMI in line with the criteria of the CDC committee into four groups, namely underweight (less than percentile 5), normal weight (percentile 5 to 85), overweight (percentile 85 to 95) and obese (percentile more than 95) (27). Data collection was done using the 23rd version of SPSS software and descriptive statistics (mean, standard deviation, ...).

To describe the variables, Kolmogorov-Smirnov test was utilized and to check the normality of the data, Chi-square test was used. Moreover, for the agreement between variables, the Pearson correlation coefficient test was employed and to examine the relationship between variables T test was implemented. Additionally, for the comparison between means and in the case of non-normal variables, Mann-Whitney test was applied. ANOVA test (variance analysis) was used to compare variables levels and also in the case of non-normal variables, Kruskal Wallis test was employed.

FINDINGS:

In total, data from 293 students, studying in Secondary School, was collected, of which 50.6% were male and 49.4% were female. The average age of the students was (14.0 ± 18.97) , BMI (22.4 ± 41.95) , weight (59.15 ± 33.09) , height (162.9 ± 25.5) , and average score of (17.1 ± 89.56) . The fathers of most students were civic servants (112 father or 46.9%) and only 20 of the fathers were unemployed. Obesity among the students, based on percentile, was 18.8% and 22.2% (table 1).

Based on K-S Test the distribution of data in normal ($P > 0.05$). The average index for body mass in the two sexes was similar and the average weight and height was varied (table 2). Using Pearson correlation coefficient between age and height ($P = 0/003$, $r = 0/193$) and the number of family members and height ($P = 0/03$, $r = 0/141$) a positive and meaningful statistical relation was found. There was no meaningful relation between the various occupational position of the fathers of the students and the age, number of family members, height, obesity in the student, and the order of children in the family ($P > 0.05$).

Table 1: Frequency Distribution of the Students Based on BMI Percentile

BMI Percentile	Number (percentage)
<5	19 (7.9%)
5-85	122 (51%)
85-95	53 (22.2%)
>95	45 (18.8%)
Total	239 (100%)

Table 2: Comparison of the Standard Deviation and the Mean of the height, weight, and BMI of the students Aged 12-16 based on gender

Component	Female (Mean±SD)	Male (Mean±SD)	t-test	P-value
Weight (Kg)	57.17±13.29	61.42±16.44	2.195	P=0.029
Height (m)	159.01±6.84	165.41±10.73	5.478	P<0.001
BMI(Kg/mm ²)	22.47±4.63	22.35±5.26	-0.204	P=0.838

Using independent t-test between the average weight and height on the male and female students, a meaningful difference was found ($P < 0.05$).

Table 3: the Comparison between the Mean and Standard Deviation of Weight, and BMI of the Students aged 12-16 based on Fathers' Occupation

Component	Civic Servant (Mean±SD)	Self-employed (Mean±SD)	Unemployed (Mean±SD)	F	P-value
Height	162.74±9.64	161.82±8.66	161.80±13.40	0.276	0.759
Weight	59.91±14.44	57.18±14.60	60.50±18.60	4.206	0.016
BMI	22.58±4.19	21.64±4.58	25.59±5.85	5.69	0.004

Using on one-way ANOVA a meaningful relation was found between fathers' job and the weight and BMI of the students. The mean for the weight and BMI of the students with unemployed fathers was high

DISCUSSION:

The present study is a descriptive cross-sectional study which aimed to determine the prevalence of obesity among middle-class students aged 12 to 16 in the city of Ahvaz. Based on the findings, 18.8% (45 people) of these students were obese and 22.2% (53 people) were overweight. Among male students the prevalence of obesity and overweightness was 25.6% (31 people) and 17.4% (21 people), respectively. Among female students the prevalence of obesity and overweightness was 11.9% (14 people) and 27.1% (32 people), respectively.

Previous reports reported different findings. In this regard, the study conducted by Torabi *et al.* (2016) (28), with the goal of determining the prevalence of obesity and overweightness among 1366 middle-class students aged 12-14 in the city of Zanjan, stated that 9.3% of the youth were suffering from obesity and 2.12% were overweight. Furthermore, in a study conducted by Hemati Maslak Pak (2016) (29), aiming to determine the prevalence of obesity and overweightness of 800 female high school students in the city of Urmia, it was concluded that the prevalence of underweightness, obesity, and overweightness was 5.20%, 2.9%, and 9.10%, respectively. In the study of Heidari *et al.* (2014) (30), conducted to determine the prevalence of obesity and its related factors among 992 high school students in the city of Jahrom, it was concluded that the prevalence of obesity and overweightness among students based on body mass index was 4.1% and 14.2%, respectively. In the studies conducted by Al-Hazzaa *et al.* (2014) (31) on 2908 students in Saudi Arabia, the prevalence of obesity among male participants was 24.1% and among the female participants it was 14%. Lowry *et al.* (2013) (32) conducted the same research on 10007 American students and reported the prevalence of obesity and overweightness 19% and 17.8%, respectively. In

India, the prevalence of overweightness among females was reported to be 11.9% and obesity was reported to be 6.31% (33). In Sicily, the prevalence of overweightness in children aged 11 was reported 40% and children aged 15 in was reported to be 25% (34). The reasons for difference in the prevalence of obesity in Iran and other countries are, among others, life-style, diet, race, and different methods in measurement and sampling.

In the present study, a meaningful difference was seen between the height and weight of male and female students, however, the level of BMI was similar in both groups, in a way that male students were more obese and overweight compared to female students. Accordingly, the results of the study carried out by Sophia E. Day *et al.* (2014) (35) on middle-class New York students, during 2006 to 2011, demonstrated that obesity and overweightness is more prevalent among male students. Josep L. Coll *et al.* (2015) (36) reported the prevalence of obesity among adults in Iceland and Mediterranean areas as 11.8% among men and 10.8% among women, which was not meaningful, however the weight, height, and BMI level among the two groups of men and women showed a meaningful difference ($P < 0.001$) T in a way that it was higher among men. The study of Al-Hazzaa reports the prevalence of obesity and overweightness among the youth to be 39.9% 45.6% among the male participants and 30.4% and 38.7% among the female participants, respectively. Also, the comparison of the mean of the total weight and height and BMI was higher in men than women (31). In the study conducted by Heydari, the mean for the anthropometry (weight, height, BMI) indexes of the male students was higher than that of the female students. Among the male students' obesity was 4.2% and overweightness was 16.1%. For the female students' obesity was 3.9% and overweightness was 12.2%. The difference between male and female students was not meaningful (30). In a study that

Garcia et al. (2013) (37) conducted on Spanish children aged 2 to 16, the prevalence of obesity and overweightness in female students was more than male students, which is in contrast to the present study.

Also, in this study, no meaningful statistical relation was found between the occupational position of the fathers and the obesity of the student. However, a meaningful statistical relation was found between the weight mean and BMI, in a way that students with unemployed fathers had a higher mean for weight and BMI compared to the students with employed fathers. In the study of Habibi et al. (2015) (38), which was conducted with the goal to examine the epidemiology of obesity and overweightness among students aged 7 to 12 in the city of Sanandaj, no statistical relation was found between the fathers' job and overweightness, which is in accordance with the findings of this study. In the study conducted by Baigi et al. (2008) (39), with the goal of determining the family danger factors of obesity among the preliminary students in the city of Neyshabour, it was shown that in the group of obese children, most fathers were self-employed (54.0%). Chi-square test demonstrated that there is a meaningful relation between the fathers' occupation and the obesity of the students. In the study conducted by Jalilvand et al. (2012) (40), with goal of determining the prevalence of obesity and its related factors, among high school students of northern Khorasan, it was shown that the mean for body mass index, based on the fathers' occupation of the participants of both genders, and in general, was not meaningful. This is in contrast to the results of the present study. The results from Abtahiv et al. (2009) (41) showed a meaningful relation of the occupation of the parents with obesity and overweightness. In other studies, it was shown that the danger of obesity is increased among the examined children aged 10 and 11 with unemployed parents (42). In the study conducted by Danielzik et al. (2004) (43) on German children aged 5-7, it was shown that the prevalence of obesity and overweightness is higher in lower strata of the economy. It seems that among students with unemployed parents, due to the weak economic power of the family, it is more likely that the students turn to unhealthy and unnecessary food, and this causes the danger of overweightness and obesity.

Limitations: one of the limitations of this study was the limited number of the participant students, although it was more than the minimum number needed, there were no official record of the parents' occupation and the authors recorded the data

provided by the students. This study was conducted in an urban setting with a higher level of welfare and less physical activity, with school buses taking children to school, compared to a rural setting and small towns. Thus, by expanding the scope of the study to rural communities with lower economic power, a lower overweightness frequency can be expected.

CONCLUSION:

The present study showed, although there were major programs and public education in recent years, the prevalence of obesity and overweightness is relatively high among Ahvaz population and obesity is still present as a health issue. Thus, implementing intervention programs with the goal of correcting the factors effecting obesity and overweightness, such as improving life-style and, more importantly, increasing physical activity among the student population and educating the parents and teachers regarding the dangers of obesity, is necessary.

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