Prevalence of Abdominal Obesity in Adolescents 2012, Birjand, East of Iran

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Brief Communication

ABSTRACT

Background: Prevalence of obesity in children has been increased during recent decades all over the world. Obesity, particularly, abdominal obesity (AO) is associated with the risk of metabolic syndrome and cardiovascular disease. This study aimed to assess obesity and central obesity within students aged 11-18 of Birjand city.

Methods: This cross-sectional and descriptive- analytical study was conducted on 2458 secondary and high school students, including 1345 girls (54.8%) and 1113 boys (45.2%), who had been selected from Birjand Middle and high schools through multiple-cluster sampling in 2012. For determination of AO, waist circumference and the percentage 90 or more regarding age and sex were used. The obtained data were analyzed by using statistical *t*-tests and χ^2 at the significant level $P < 0.05$.

Results: Among the studied students, average 16.3% (20% of boys and 13.2% of girls) had AO. The obtained data about these two groups shows statistical significant difference of $P < 0.001$. Chance of AO in boys was 1.6 times greater than that of girls. Odds ratio (OR) = 1.6 (confidence interval [CI]: 1.3-2.1). It was 1.9 times more about under 15-year-old than over 15 aged subjects. OR = 1.9 (CI: 1.5-2.4).

Conclusions: Regarding high prevalence of AO in Birjand adolescents, it is recommended that adolescents and their families should be warned for long-term outcomes of obesity on quality-of-life. Periodic studies are suggested for awareness of obesity trends in the coming years.

Keywords: Abdominal obesity, adolescent, Birjand, Iran, obesity

INTRODUCTION

During recent decades, significant worldwide increasing of obesity in adolescents has been reported.[1-4] Obesity, particularly, abdominal obesity (AO) is a main risk factor in the occurrence of cardiovascular diseases and type II diabetes.[5,6]

The international diabetes federation considers AO of adults as the principle component of metabolic syndrome.[7] previously, adipose tissue were known as the energy reservoirs, while recently,

it is assumed an organ bearing different functions having fundamental role in the occurrence of insulin resistance.[8]

Today, it is known that intra-abdominal fat has the most decisive role in development of insulin sensitivity.[9] Changes in the life style such as consuming fast foods and sedentary living causes to the ever-increasing of obesity in different communities, such as ours, especially among adolescents.[2,10-12]

Therefore, study about the prevalence of obesity in adolescents in various regions of our country is necessary. The present research aimed to determine the prevalence of AO within 11-18 years old middle and high school students of Birjand in 2012.

METHODS

Subjects

The present cross-sectional and descriptive- analytical study was carried out on 2458 numbers of 11-18 years old in Birjand students (i.e. 1345 girls and 1113 boys) in 2012. Birjand is the center of South-Khorassan province, East of Iran. Samples were selected through multiple-cluster sampling. Since, middle and high schools were distributed in different districts of the city, at first 14 girls' schools (7 middle, and 7 high schools) and 14 boys' schools (7 middle schools and 7 high schools) were selected. Following this, based on the population of each school and its ratio to the total population of middle and high school students, some students were selected from each class. In following, questionnaires plus consent forms were sent to the parents of 2800 selected students. The parents were demanded to fill out the demographic and consent forms and return them to school if they agreed with their kid's participation in the plan; and if their kid did not have any chronic disease or endocrine disorder such as diabetes or he/she was not in the treatment for corticosteroids. Finally, 2590 questionnaires were filled out and returned to school.

Assessments

Trained co-workers of the project, after getting the permission of the education office and ensuring coordination with it, referred to schools and recorded the waist circumference (WC) of the participated students in a standard way and registered each at the respective form. At the end, a few of the cases were excluded because of defects in the information offered and the final population of the subjects was 2458 students. The WC of each individual was measured, while the person was standing and exhaling, by wrapping a measuring strip between the last vertebra and the prominence of iliac, allowing for an error of 0.5 cm. In order to pinpoint AO the percentage ≥90 regarding age and sex was taken as a measure.

Analysis

Statistical analysis was performed by means of SPSS version 15 software. Compare of qualitative variables was performed using independent *t*-test and Chi-square test and odds ratio (OR) was calculated. $P \leq 0.05$ was considered as significant.

RESULTS

In this study, 2458 students including of which 1345 girls and 1113 boys were assessed. The age of the students ranged between 11 and 18 years with mean 14.5 ± 2.0 years.

Mean WC of the students was 68.4 ± 9.7 cm, ranging between 47 and 114 cm. Mean WC of the girls was 67.8 ± 8.4 and that of the boys was 69.1 ± 11 cm. This is statistical significant difference of $P = 0.01$. Mean WC of boys was more than of girls at all ages [Figure 1 and Table 1].

Prevalence of AO was 16.3% (20% in boys and 13.2% in girls). The difference was significant ($P < 0.001$). Chance of AO in boys was 1.6 times greater than that of girls. OR = 1.6 (confidence

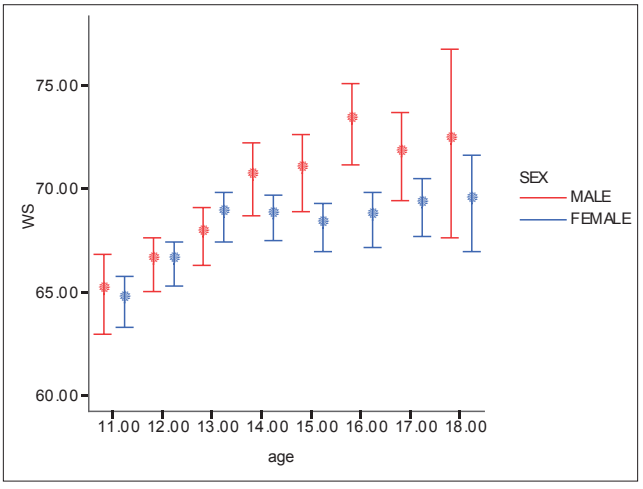

Figure 1: Mean waist circumference according sex and age

interval [CI]: 1.3-2.1) (AO odds in boys 60% is increased). Table 2 indicates relative and absolute frequency of AO in both sexes in different age groups.

Prevalence of AO was 11.2% in over 15 years and 19.4% in subjects under 15 ($P < 0.001$). Chance of AO was 1.9 times more in fewer than 15 years in comparison with over 15 individuals. OR = 1.9 (CI: 1.5-2.4) (AO odds in under 15 years 90% is increased).

DISCUSSION

The findings of this study indicate that the prevalence of AO in Birjand Middle and High school students was 16.3%. Two other studies on 11-15 and 15-18 years old reported that overweight was 5.2% and 6.1%, and obesity was 2.1%, respectively.[13,14] Another article reported overweight and obesity about 2-5 years old kids of Birjand as 10.6% and 7.6%, respectively[15] However, AO was not examined in those studies. In another research prevalence of AO in elementary school children of Birjand 15.7% has been reported.[16]

Table 1: Mean WC in our subjects according age and gender

Age groups	Boys		Girls		*P* value
	n	Mean WC±SD	*n*	Mean WC±SD	
11	105	64.94±9.85	139	64.57±7.37	0.76
12	214	66.38±9.53	240	66.41±8.51	0.93
13	240	67.73±11.21	225	68.67±9.20	0.32
14	148	70.48±10.72	217	68.63±8.00	0.05
15	138	70.80±10.93	163	68.15±7.52	0.01
16	156	73.16±12.25	146	68.50±8.11	<0.001
17	90	71.58±10.07	147	69.14±8.53	0.05
18	22	75.09±11.97	68	69.01±9.37	0.03
Total	1113	69.17±9.85	1345	67.82±8.43	0.01

WC=Waist circumference, SD=Standard deviation

Table 2: Prevalence of AO in our study

Age groups	Boys		Girls		*P* value
	n	AO %	*n*	AO %	
11-12	319	22.3	379	19.5	0.21
13-14	388	20.9	442	16.1	0.04
15-16	294	20.7	309	8.4	<0.001
17-18	112	8.9	215	3.3	0.02
Total	1113	20	1345	13.2	<0.001

AO=Abdominal obesity

Comparison between the present study and the previous study on 11-19 years old students of Birjand indicates progressive prevalence of AO. Furthermore, other studies have reported obesity growth in Iranian adolescents. According to Caspian's study on 6-18 years old children, 6-9% had AO and 7.5-11% had generalized obesity.[17] Another study on 14-17 years old girls of Tehran revealed that 7.1% had AO.[18] Moreover, another research about 15-18 years old Iranian adolescents was showed that 0.9% of boys and 7.6% of girls had AO. Among them, 40% who suffered from metabolic syndrome had AO, although only %3 of the normal subjects had AO.[19] Various studies in different countries have reported very different prevalence of obesity in adolescents whereas, in many studies high and progressive prevalence of AO have been shown. The presented results in a review article about 10-19 years old adolescents indicate AO in developing and developed countries ranged between 3.8-51.7% and 8.7-33.2%, respectively. Thus, the study found that AO is more prevalent in developing countries than that in developed ones, but it was not sex-depended.[20] According to another study on United Arabic Emarate (UAE) 12-18 years old adolescents, AO was diagnosed in 16% with the average contents of 22% males and 4% females.[21] In 13-19 years old adolescents of Greece, AO in girls and boys was 21.7% and 13.5%, respectively.[22] In 14-19 Brazilian adolescents, AO was 6%. It was higher in females (6.7%) comparing to males (4.9%).[23] In 10-19 Brazilian year olds, AO was 6.6%.[24] Another study on Brazilian adolescents diagnosed that AO was 32.7% and it was higher in girls (36.3%) than that in boys (28.4%).[25] According to the obtained results of the present study, prevalence of obesity in Birjand adolescents has now increased compared to previous years. The same results could be found within other countries. In Canadian adolescents, prevalence of AO was 1.8%, 2.4%, and 12.8% in 1981, 1988, and 2007, respectively, which was in accord with age increase and more prominent in girls than that in boys.[26] In China, AO increased at the age range of 6-17 years from 1993 to 2009, such that it increased from 4.9% to 11.7%. Meanwhile, generalized obesity increased from 6.1% to 13.1%. One can concluded that during mentioned time, AO increased more than generalized one.[27] The present study revealed that AO in Birjand

adolescents was 16.3%; more prevalent in boys than that in girls. Prevalence of the problem in the area was higher than that of many other areas of Iran, however it was at an average level compared to that of other spots adolescents of the world. Many of studies identified no difference with sex point of view.[20] It is notable, despite that some of the studies found that the prevalence of AO is more in girls (e.g. Greece and Brazil studies)[22,25] herein, the problem was more observable in boys. This finding is in agreement with reported results in UAE.[21]

Identifying the cause of different prevalence in the two genders requires more studies. Probably, in some developing areas like Birjand, due to cultural and social conditions boys have more freedom of choice, which results in they become more prone to life style changes like preferring fast foods than home-cooked ones and computerized entertainment. Maybe, another reason is that female adolescents are more concerned about their physical appearance and fitness. Compared to previous studies carried out in Birjand, prevalence of obesity in adolescents has increased. Similar findings have been reported about many developing countries in recent years. It can be due to changes in lifestyle, nutritional transferable, using fast foods and high calorie foods, and sedentary lifestyle because of computer games and watching TV instead of games requiring physical activity. One of the restrictions of this study being excluded a number of subjects due to the dissatisfaction of the student or his parents.

CONCLUSIONS

This study shows high prevalence of obesity in adolescents of Birjand, which is similar in other parts of the world. National health policy should be prevented adolescent obesity. Those include: Appropriate intervention efforts, notify adolescents and their families for predisposing factors for complications of obesity and its long-term risk, inclusion of appropriate educational programs in the school curriculum, and lifestyle improving. Periodic studies is needed for evaluate the prevalence of adolescent obesity in the next years. It is recommended to other studies for investigate about reasons of adolescent obesity and finally intervention procedures to control of obesity in adolescents.

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