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Relationship Between Android Obesity and Menstrual Disorders in Different Ages of the Menarche

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Abstract

Objectives: Obesity affects various aspects of puberty development, including the hormonal parameters and onset of puberty during puberty. Therefore, the purpose of this study was to investigate the relationship between android obesity and menstrual disorders in different ages of menarche.

Materials and Methods: The present cross-sectional study adopted a cluster-sampling method to evaluate 2000 girls (aged 9-18) who were selected from all regions of Shiraz. Then, questionnaires were completed, including data on demographic characteristics, menstrual disorders, and the like. Then, their weight, height, waist, and the circumference of the hip were measured by the standard method, and finally, the data were analyzed by SPSS using statistical tests.

Results: A number of 1945 (97.3%) out of 2000 girls had android obesity <0.85 and 55 (2.8%) of them suffered from android obesity >0.85. Based on the results, no significant relationship was observed between android obesity and bleeding duration ($P=0.09$), menstrual cycle length ($P=0.76$), amenorrhea ($P=0.98$), dysmenorrhea ($P=0.31$), spotting ($P=0.24$), passing clots (P=0.35), menstrual regularity ($P=0.89$), and menstrual bleeding ($P=0.08$). However, a meaningful relationship was found between android obesity ($P=0.001$) and body mass index (BMI).

Conclusions: In general, most subjects did not have android obesity. Based on the results, there was a meaningful relationship between BMI and android obesity. However, no meaningful relationship was found between bleeding duration, passing clots, menstrual regularity, menstrual cycle length, amenorrhea, dysmenorrhea, spotting, and menstrual bleeding. Therefore, the necessity of paying more attention to adolescents in intervention programs and education is felt more than before in order to improve their nutritional status and health.

Keywords: Adolescents, Age at menarche, Android obesity, Menstrual disorders, Students

Introduction

In the 21st century, general and abdominal obesity is on the rise alarmingly and it is one of the biggest health challenges in the world (1). Android obesity, which is characterized by high fat distribution in the abdomen, is associated with a higher health risk compared to the collection of fats in the thighs and the hip (2).

The prevalence of obesity is rapidly increasing in many industrialized countries, especially the United States and developing countries. Accordingly, the systematic studies of 191 countries show that there are 1.46 billion overweight and 504 million obese people worldwide. Research suggests that the prevalence of overweight and obesity is increasing in Iran (3). Based on a systematic review, the prevalence of android obesity is estimated from 3.8% to 51.7% and 8.7% to 33.2% in developing and developed countries, respectively (4). In addition, childhood obesity has been observed in both developed and developing countries, and extreme obesity can affect puberty onset and hormonal parameters during puberty (5).

On the other hand, there is a great relationship between android obesity and hyperandrogenism while body mass index (BMI) is associated with insulin resistance. The most common cause of endocrine obesity has been reported in female adolescents with polycystic ovary syndrome (6). Many girls are unaware of obesity and overweight and their lifestyle is unhealthy. Further, obesity is considered a barrier to physical, mental, and social well-being which leads to more serious illnesses and disorders. Thus, it is necessary to evaluate the health status of adolescents and children in the community on a regular basis, and the necessity of such research is well felt because android obesity is one of the most important and accessible indicators in this respect. Therefore, this study sought to determine the relationship between android obesity and menarche disorders in the menarche age.

Materials and Methods

This epidemiological and cross-sectional study was done in 2014-2015. The study population included all girls in elementary, middle, and high school levels in four districts of Shiraz. According to Akbarzadeh et al(6), with the

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confidence level of 95%, the sample size was determined as 1625 individuals out of 2000 individuals with a 20% probability of dropouts based on the following formula.

$$n = \frac{Z^2 pq}{d^2}$$

1-α = 0.95, d = 0.01, q = 1-p, P1 = 0.35, P2 = 0.60, P3 = 0.05

Furthermore, the study considered 9-18-year-old girls studying in elementary, middle, and high school levels, the lack of taking any medication except for anti-allergens and analgesics (3 months before the study), and the lack of chronic mental or physical illness. On the other hand, subjects were excluded from the study if they were a professional athlete, had experienced a major or traumatic accident for the past 6 months, were taking psychotropic drugs, had a special diet, were married, and suffered from mental illness in the last year and a medical illness. The study environment was Shiraz girls' schools. In the first stage, 6-8 schools in each district were considered as clusters for sampling. Then, 500 students from different educational levels were selected via a simple intended sampling. This study was conducted based on obtaining the admission of postgraduate authorities and the approval of the ethical committee, having the coordination of the Department of Education, and finally, obtaining a letter of introduction from the University Security Center and providing it to selected school officials.

The researcher asked the research units to fill a demographic-designed questionnaire, Higham chart, and the Menstrual Bleeding Characteristics questionnaire related to menstrual periods in the past year, including data on the length of menstrual bleeding, menstrual period, and menstrual regularity using standard Smith-DiJulio criteria (7, 8) Then, the content validity method was used to determine the scientific validity of the questionnaire. Therefore, the questionnaire form was prepared and approved by a number of faculty members after studying valid books and scientific articles and obtaining a complete knowledge of confounding variables.

Next, the sample students' weight, height, and hip and waist circumference were measured and recorded by the researcher. It should be noted that the weight and height of the students were estimated by the researcher with minimal clothing and barefoot. In addition, the SECA scale was used to measure the weight with an accuracy of 0.1 kg. Further, a non-elastic tape meter with a standard metal meter and the accuracy of 0.1 ± cm was applied to calculate and record the seizes while legs, knees, hips, shoulders, and the back of the students were along the straight lines and arms were free on either side. Moreover, BMI was computed based on the weight formula (kg) divided by the square of height (m) according to (9). It should be noted that students were assured of data confidentiality. Finally, the data were analyzed using SPSS software (version 21) by inferential and descriptive statistics.

Results

Based on the data in Table 1, 1945 out of 2000 subjects (97.3%) had android obesity lower than 0.85 while 55 (2.7%) of them had android obesity higher than 0.85. The mean and standard deviation (SD) were equal to 0.71 ± 00.07, and the highest and lowest values were 0.98 and 0.46, respectively. The results of Table 2 indicate that there is a meaningful relationship between BMI and android obesity in girls ($P = 0.001$). The findings further demonstrate that the types of menstrual disorders and android obesity are related to each other (Table 3). However, no significant association was observed between android obesity and bleeding duration ($P = 0.09$), menstrual cycle length ($P = 0.76$), amenorrhea ($P = 0.98$), dysmenorrhea ($P = 0.31$), spotting ($P = 0.24$), clot disposal ($P = 0.35$), menstrual regularity ($P = 0.89$), and menstrual bleeding ($P = 0.08$).

Table 1. Frequency of Android Obesity Among Shiraz High School Students

Android Obesity	No. (%)	Mean ± SD	Minimum Value	Maximum Value
Less than 0.85	1945 (97.3%)	0.71 ± 0.07	0.46	**0.98**
More than 0.85	55 (2.7%)			
Total	2000 (100%)			

Note. SD: Standard deviation.

Table 2. Relationship Between BMI and Android Obesity in Shiraz Female Students

Android Obesity	<0.85	>0.85	Total	Fisher's Exact Test	*P* Value
BMI, N (%)				18.22	**0.001**
≤18.5	763 (39.2%)	11 (20%)	774 (38.7%)		
18.5-24.9	993 (51.1%)	30 (54.5%)	1023 (51.2%)		
25-29.9	167 (8.6%)	11 (20%)	178 (8.9%)		
≥30	22 (1.1%)	3 (5.5%)	25 (1.3%)		
Total	1945 (100%)	55 (100%)	2000 (100%)		

Note. BMI: Body mass index.

Table 3. Relationship Between Android Obesity and Menstrual Disorders Among Student Girls in Shiraz

	Android Obesity	< 0.85	> 0.85	Total	Type of Test	*P* Value
	No. (%)	No. (%)	No. (%)	No. (%)		
Duration	> 2	7 (0.5)	2 (5.3)	9 (0.6)	7.31	0.09
	5- 3	359 (26.6)	11 (28.9)	370 (26.7)		
	5- 7	754 (55.9)	20 (52.6)	774 (55.8)	Fisher's exact	
	7- 10	205 (15.2)	5 (13.2)	210 (15.2)		
	< 10	23 (1.7)	-	23 (1.7)		
	Total	1348 (100)	38 (100)	1386 (100)		
The length of the menstrual cycle	< 21	142 (10.5)	4 (10.5)	146 (10.5)	1.15	0.76
	21- 35	1011 (75)	27 (71.1)	1038 (74.9)	Chi-square	
	36- 45	112 (8.3)	5 (13.2)	117 (8.4)		
	>45	83 (6.2)	2 (5.3)	85 (6.1)		
	Total	38 (100)	1348 (100)	1386 (100)		
Menstrual regularity	≤ 6	518 (38.4)	15 (39.5)	533 (38.5)	0.01	0.89
	> 7	830 (61.6)	23 (60.5)	853 (61.5)	Chi-square	
	Total	1348 (100)	38 (100)	1386 (100)		
Menstrual volume	≤ 100	918 (68.5)	31 (81.6)	949 (68.8)	2.95	0.08
	> 100	422 (31.5)	7 (18.4)	429 (31.2)	Chi-square	
	Total	1340 (100)	38 (100)	1378 (100)		
Amenorrhea	Yes	8 (0.6)	-	8 (0.6)	0.24	0.98
	No	1337 (99.4)	41 (100)	1378 (99.4)	Fisher's exact	
	Total	1345 (100)	41 (100)	1386 (100)		
Dysmenorrhea	Yes	1050 (77.9)	2 (4.9)	1077 (77.7)	0.99	0.31
	No	298 (22.1)	-	309 (22.3)	Chi-square	
	Total	1348 (100)	38 (100)	1386 (100)		
Spotting	Yes	198 (14.7)	3 (7.9)	201 (14.5)	1.37	0.24
	No	1150 (85.3)	35 (92.1)	1185 (85.5)	Chi-square	
	Total	1348 (100)	38 (100)	1386 (100)		
Passing clots	Yes	537 (39.8)	18 (47.4)	555 (40)	0.87	0.35
	No	811 (60.2)	20 (52.6)	831 (60)	Chi-square	
	Total	1348 (100)	38 (100)	1386 (100)		

Discussion

The mean and SD of android obesity in this study was equal to 0.71 ± 0.07. According to standard percentiles, most studied people with obesity had normal abdominal obesity, and the frequency of abdominal obesity was 2.8%. Abdominal obesity is not so prominent in our study probably due to the gender and age of the subjects who are usually sensitive to their abdominal obesity. The frequency of abdominal obesity in our study was consistent with the results of a previous study in Shiraz (6) while contradicting those (43.1% and 21.2%, respectively) of Asghari et al (9) and Yoshiike et al (10). Thus, this can be considered as a warning and one of the major contributors to the growth of the metabolic syndrome, showing that the risk of this problem will increase in subsequent years.

In a study by Bazhan et al, a significant positive correlation existed between BMI and android obesity (11), which is in line with the findings of the present study. In the study by Caprio et al, the waist-to-hip circumference ratio of obese girls was also significantly higher than that of non-obese girls (12). Similarly, the results of another study on the effect of obesity and android obesity confirmed those of the present study and showed that fat accumulation was greater in the central areas of the body in obese adolescents (13).

It was previously thought that menstrual disorders in metropolitan areas were more likely compared to small towns because of the lifestyle pattern. However, the results of the study by Negi et al showed that globalization has changed adolescents' lifestyle patterns in every way (14). The results of other studies presented that that dysmenorrhea had the highest rate of all menstrual disorders among students, confirming the fact that dysmenorrhea is typically prevalent in 70-90% of adolescent girls (15-17). Accordingly, dysmenorrhea affects the diet and physical activity, healthy physical activity and regular exercise in adolescent girls are less likely to be recommended because of dysmenorrhea (18).

In this study, there was no meaningful relationship between android obesity with the duration of bleeding, menstrual cycle length, amenorrhea, dysmenorrhea, spotting, clot disposal, menstrual regularity, and

menstrual bleeding, which was inconsistent with the findings of the following studies. Lee et al (19) reported significantly higher menstrual disturbances in girls with eating disorders as a result of losing weight ($P<0.05$). In a population-based study, Wei et al (20) examined the effect of obesity on the occurrence of some disorders such as menstrual. The results demonstrated that both general obesity and central obesity have a direct relationship with the increased incidence of menstrual disorders. Further, there was a significant relationship between overweight and obesity with amenorrhea and oligomenorrhea (0.05) while no significant relationship was observed between low BMI and oligomenorrhea (0.01) in the current study. The reason is the higher rate of natural android obesity in the present study.

In the educational and executive planning of adolescents and students, a priority should be given to providing practical templates in order to inform girls and their parents about this issue. One of the strengths of the study was sampling among female students in ten age groups. On the other hand, one of the limitations of this cross-sectional study is that prospective studies may be needed to evaluate the relationship between some variables. Another limitation was that nutritional status was not assessed in this study. Further, sampling was only done in the urban areas of Shiraz due to some problems while rural areas were not studied due to the cost of transportation. Accordingly, it is suggested that subsequent prospective studies be conducted in rural and urban areas of Shiraz simultaneously.

Conclusions

In this study, most studied subjects did not have android obesity. Although there was a meaningful relationship between android obesity and BMI, no meaningful relationship was found between the length of menstruation, menstrual cycle duration, amenorrhea, dysmenorrhea, spotting, clotting disposal, menstrual regularity, and menstrual bleeding. The low level of abnormal android obesity in our study is related to the gender and age of the intended subjects who are typically sensitive to abdominal obesity. Therefore, it is necessary that adolescents pay attention to health interventions and training programs. The need for this training is increasingly felt for promoting general health and menstrual health in order to prevent many current and future problems of women (i.e., infertility, obesity, and polycystic ovaries).

Conflict of Interests

Authors have no conflict of interests.

Ethical Issues

The local Ethics Committee of Shiraz University of Medical Sciences approved the study protocol (grant number 7173). Permissions were also received through the authorities in the schools. Written informed consents were collected from all the participants. The confidentiality of all participants' personal information was assured. Furthermore, they were allowed to withdraw from the study at any time.

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