

## The Assessment of Eating Behaviors of Obese, Over Weight and Normal Weight Adolescents in Shiraz, Southern Iran

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### ABSTRACT

#### Background

Obesity is one of the most common nutritional problems in adolescent. Knowing eating behavior of adolescents improve our understanding about this pandemic and helps design an appropriate preventive and care plan.

#### Methods

In a cross-sectional study, 372 students selected randomly from 8 guidance schools of Shiraz, Iran, during August-December 2009. Body weight was measured to the nearest 0.1 kg, height was measured in bare feet to the nearest 0.5 cm. Adolescents with a Body Mass Index (BMI) over the 85th but less than 95th percentile are considered overweight and those with a BMI greater than the 95th percentile are considered obese. Eating behaviors was assessed using Dutch eating behavior questionnaire (DEBQ). The analysis was performed using the SPSS statistical software version 13. A P value of less than 0.05 was considered as statistically significant.

#### Result

The mean age of adolescent was 13.43±0.973 years. Of population studied, 23.9%, 22.35% and 53.8% were found to be obese, overweight and normal weight. There was significant differences between restrained and external eating score in obese and overweight groups (P=0.0001). Restrained eating score in obese and overweight adolescent was higher than those of normal weight group. There was no significant difference between emotional eating behavior in adolescent (P>0.05). There was a positive significant correlation between dietary restriction and BMI (r=0.36) in adolescent (P=0.000).

#### Conclusion

Understanding the individual differences in eating behaviors is the first step in modifying programs for obesity. Emotional eating behavior is also recommended to be considered in designing preventive programs.

**KEYWORDS:** Eating behaviors; Obese; Overweight; Normal weight; Adolescents

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## INTRODUCTION

Nowadays obesity is the most common nutritional disease in children across the world.<sup>1-3</sup> According to American Association of pediatrics, children with a body mass index (BMI) over the 85<sup>th</sup> but less than 95<sup>th</sup> percentile are considered overweight and those with a BMI greater than the 95<sup>th</sup> percentile are regarded as considered obese.<sup>4</sup> The prevalence of obesity among children had increased significantly during last decades. Statistics showed that one in four children in United States is overweight and 11% are obese.<sup>5,6</sup> Prevalence of obesity in Iranian children is also high; in a study conducted by Pishdad et al. (1996), the prevalence of overweight and obesity were 11.3% and 2.9% among 13-18 years old children.<sup>7</sup> Obesity and overweight due to inactivity and inappropriate eating behavior caused 300,000 deaths annually.<sup>8,9</sup> The direct and indirect cost of obesity estimated to be more than 100 billion dollars whereas for cardiovascular disease it was 40.4 billion dollars of which 17% related to obesity.<sup>10,11</sup> Studies showed that overweight children and adolescent definitely become obese adult if they do not observe appropriate nutritional and activity patterns program. Furthermore, they also become increasingly susceptible to complicated illnesses such as cardiovascular disease, type 2 diabetes and renal failure.<sup>12-15</sup> Obesity is associated with many psychological problems such as poor body image, social isolation, poor self-esteem, educational problem and depression.<sup>16-18</sup>

The causes of obesity are complex and not well understood. Diverse childhood dietary habit is considered as the main cause of obesity. Obesity usually results from consuming a variety of nutrients combined, rather than a single food.<sup>1,5</sup> Obese subjects may be under-responsive to internal satiety cues; over-responsive to external food cues, and overreacts in response to certain emotions.<sup>19</sup>

Adolescent is a critical period in life with hormonal, physical and emotional

changes. Furthermore, high risk behavior during this period increases the risk of many diseases in adulthood.<sup>20</sup> Decreased activity due to long hours of watching television, playing computer games, consumption of fast food and carbonated drink are the high risk behavior during adolescent. In a study conducted by Kerri Boutelle (2001), 8330 overweight adolescent compared with normal weight students. The result showed that overweight adolescent had lower activity and ate less breakfast than normal weight students and had unhealthy weight control behaviors. These finding highlight the importance of planning and implementing appropriate programs for behavior modification.<sup>21</sup> On the other hand, nutritionally poor eating habits established during adolescence, have long-term health consequences and the priority of this age group is to prevent and treat obesity in order to have a desired body image.<sup>22</sup> Since understanding individual differences in eating behaviors is the first step for modifying obesity programs,<sup>23</sup> the aim of the present study was to determine and compare the eating behaviors of obese, overweight and normal weight adolescents in Shiraz, Iran.

## MATERIALS AND METHODS

This was a cross-sectional study carried out during August-October 2009, and comprised 372 randomly selected students from 8 guidance schools. The sample size was calculated as previously described.<sup>24</sup>

The exclusion criteria considered by a registered pediatric nurse were pre-existing disease or an organic cause for obesity and receiving any medication that might interfere with the study. The subjects included in the study were healthy, and aged from 11 to 16 years. Body weight was measured, in light clothing and with bare feet, to the nearest 0.1 kg; height was measured in bare feet and without hair ornaments to the nearest 0.5 cm. All

measurements were taken by the same trained individual. BMI was calculated by dividing weight (kg) by height squared (m<sup>2</sup>). BMI was used to define overweight and obesity according to development standards of American Association of pediatric. BMI over the 85<sup>th</sup> but less than 95<sup>th</sup> percentile is considered overweight and those with a BMI greater than the 95<sup>th</sup> percentile are considered obese.<sup>4</sup>

Eating behavior was assessed using Dutch eating behavior questionnaire (DEBQ) by Strein T.V in 1986 for assessing eating behaviors.<sup>25</sup> It consists of 33 items and three scales, with 13 items assigned to emotional eating (overeating in response to emotions), 10 items to externally induced eating (eating in response to food related stimuli, regardless of the internal states of hunger and satiety) and 10 items for restrained eating (attempts to refrain from eating). They rated on a 5-point Likert-type scale. In each part minimum score is 0 and maximum 5. For example in emotional eating subscale score 0 means that the adolescent did not eat in response to emotions and score 5 indicated overeating due to emotional status such as nervousness, happiness or excitement. In external eating the maximum score represented eating in response to stimuli such as color, smell and taste of the food and 0 score means that they did not pay any attentions to these stimuli and they only eat when they are really hungry. As for the last subscale, restrained eating, the maximum score showed that the person has more control over eating behavior and tries to refrain from eating.<sup>25</sup>

Halverson et al. (1998) assessed psychometrics properties of this questionnaire in 9-10 years old girls, and showed that there was a good internal consistency, validity and stability in regard to cronbach coefficient ( $\alpha=0.90$ ).<sup>26</sup> It was translated into Persian and back translated to English by professional translator and validated by an expert panel. Before the study, the reliability of the questionnaire was measured using

cronbach's alpha ( $\alpha=0.74$ ). The questionnaire was administered under the supervision of an academic and the researchers.

This study was approved by the research and ethics committee of Shiraz University of Medical Sciences. Consent forms for children's participation were signed by their parents. Descriptive statistics were conducted to examine the nature and characteristics of the sample. Pearson correlation analyses were used to determine the strength and direction of relationships between groups of selected variables and one-way ANOVA were applied to determine the differences in eating behavior of normal weight, overweight and obese students. The analysis was performed using the SPSS statistical software version 13 (SPSS Inc, Chicago USA). A p-value of less than 0.05 was considered statistically significant.

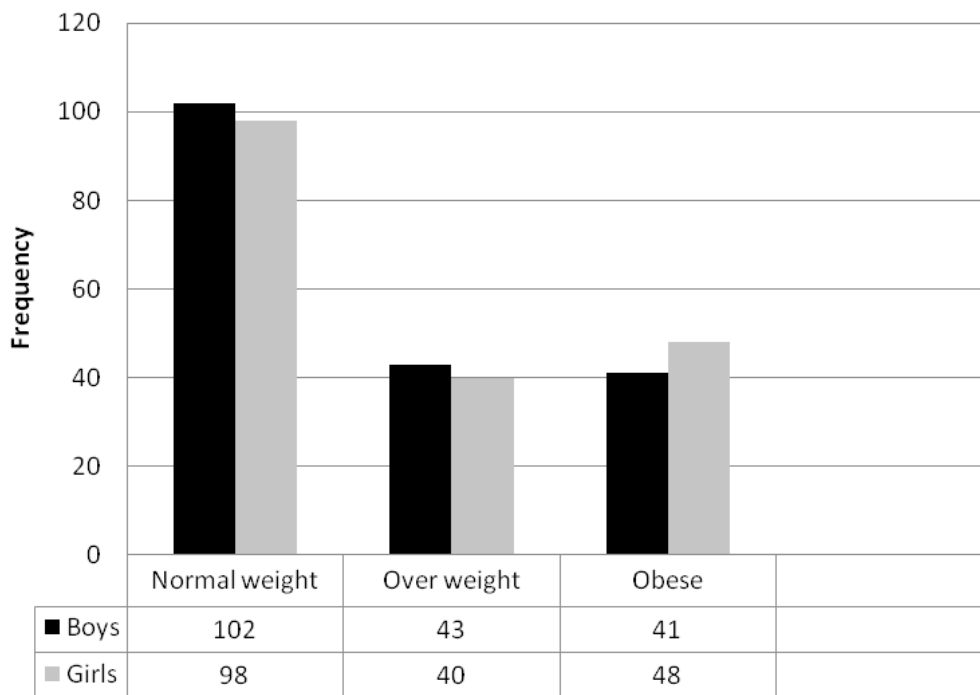
## RESULTS

The present study recruited 372 students with males to female ratio of 1:1 and mean age of  $13.43 \pm 0.973$  SD years. Of these 23.9%, 22.35% and 53.8% were found to be obese, overweight and normal weight. Detailed gender-related anthropometric data are reported in figure 1.

The overall mean score in emotional eating was 1.90, external eating 3.09 and restrained eating 2.87 in adolescent. There was a significant positive correlation between dietary restriction and BMI in adolescent ( $r=0.36$ ) ( $P=0.001$ ). According to analysis by Pearson correlations between the scales and BMI, a significant correlation emerged between restrained eating and external eating scale and BMI ( $P=0.006$ ), but not between BMI and emotional eating ( $P=0.192$ ).

In adolescent girls there were no significant relationship between external eating behavior and BMI, but this was statistically significant in boys (table 1).

There was significant differences between restrained eating and external eating in obese and overweight groups



**Figure 1:** Frequencies of normal weight, overweight and obesity in adolescents.

**Table 1:** Correlations among the three scales of the Dutch eating behavior questionnaire (DEBQ) and the BMI

Scale	BMI			
	SEX			
	Girls		Boys	
	Pearson coefficient	P value	Pearson coefficient	P value
Emotional eating	0.03	0.65	- 0.09	0.192
External eating	-0.14	0.05	*- 0.20	0.006
Restrained eating	*0.36	0.001	* 0.32	0.001

\*Significant at  $\leq 0.05$

( $P=0.0001$ ). Restrained eating score in obese and over weight adolescent was higher than those in normal weight group. There was no significant difference found among emotional eating behavior in adolescent ( $P>0.05$ ). The result of total sample’s scoring on each scale and one-way ANOVA are reported in (table 2).

## DISCUSSION

This study suggests that overweight and obesity are prevalent among the population under study. In this connection, approximately 23.9% of this population was obese and another 22.3%

were overweight. These findings are consistent with the prevalence rates for American Indian children reported in previous studies.<sup>27</sup> Recent studies in Iran showed that BMI and weight have increased over the last 20 years and the prevalence of overweight was 24.8% and obesity 8%.<sup>28</sup> This high alarming prevalence rate of obesity hopefully leads policymakers to take appropriate action in future planning. Behavior modification program in elementary schools is recommended to prevent these pandemics. Seo et al. (2005), confirm that one of the predictors of obesity in adulthood is obesity in childhood and concluded that having a normal weight during childhood is a critical factor in health during adulthood and elderly.<sup>16</sup>

**Table 2:** The comparison of eating behavior score of obese, over weight and normal weight of adolescents

Scale	Group	Mean	S.D	F	P value
Emotional	Normal weight	1.91	0.54	1.40	0.189
	Overweight	1.96	0.64		
Eating	Obese	1.80	0.66		
External	Normal weight	3.18	0.63	12.05	0.002
	Overweight	3.12	0.67		
Eating	Obese	2.88	0.70		
Restrained	Normal weight	2.63	0.80	18.30	0.001
	Overweight	2.97	0.84		
Eating	Obese	3.31	0.81		

Sig&lt;0.05

Although the prevalence of obesity is a pediatric problem and has been considered as a crisis and a pandemic,<sup>29</sup> very few treatments are prescribed for childhood obesity. New lifestyle and immobility are the most eminent reasons for childhood obesity. As children are in the stages of growth and development the treatment should not focus only on restricting food consumption but it should encourage them to acquire a healthy life style. Appropriate program for weight management should consider eating behavior, activity patterns, simultaneous family participation and stress management.<sup>30</sup> Changes in technologies in food processing and packing procedures provide good opportunities for governments to educate people and families about appropriate eating behavior and food selection.

One of the aims of our study was to assess the correlation between eating behavior and BMI of adolescent in three subgroups of normal weight, overweight and obese adolescent. Our study showed significant correlation between BMI and restrained eating behavior. However, there was no correlation between external or emotional eating behavior and weight status, both of which were independent of weight.

These findings were consistent with those of other studies reporting significant correlation between restrained eating and BMI (Pearson's correlation coefficient=0.37; P=0.01), but not between BMI and either emotional or external eating.<sup>19</sup> These findings further support the importance of developing intervention programs that target

eating behaviors of obese children.

Another aim of this study was to compare the differences between eating behavior in different subgroup (normal weight, overweight and obese adolescent).

Our study showed significant difference between restrained and external eating behaviors, but not between these and emotional eating.

Our study was comparable to a study carried out by Van Strein et al. in 1997 in which they found significant differences between three subscales of eating behavior score in 8-12 years-old obese and non obese adolescent. This is explained by the fact that obese adolescents tend to increase their adaptive tendencies in reducing their weights.<sup>11</sup>

In terms of emotional eating, our findings are consistent with other studies. Certain living habits such as dietary preference, food consumption, use of social media and sport activities require energy uptake and utilization. These are affected by diverse stimuli such as individual behaviors, including attitude, cultural and social aspects, mental status and experiences.<sup>31</sup>

Existing reports absolutely encourage behavior modification programs and lifestyle changes for appropriate weight management<sup>30</sup> Behavioral modification programs may have benefits in decreasing anthropometric indices and improving eating behavior of adolescents.<sup>32</sup> Thus, it is recommended that appropriate eating and activity pattern be included in schools curriculum. Krause and colleague emphasize that the main aim of



controlling weight in children is to acquire an appropriate and healthy eating behaviors and not weight reduction.<sup>2</sup>

According our results, there is significant differences found between eating behavior of boys and girls. Our study showed that boys and girls differ in external eating behavior. In a study conducted by Treza and Nicklas (2003), it was highlighted that boys and girls are different in eating habits. This is evidenced by the fact that boys consume more snacks and fast foods and their rates of obesity were higher than the girls by 1.2 fold.<sup>23</sup>

Studies showed that boys and girls have different eating method and their differences in food intake and selection start in adolescence. Men consume more food while women pay more attention to eat in a feminine manner with respect to social principles. Thus, further study is needed to determine gender differences in eating behavior and the etiology of weight disorder in order to prescribe appropriate treatments.<sup>33</sup>

There were some limitations to our study. Random sampling is a suitable method for factors such as representativeness and generalization. However, in our study we attempted to meet these conditions through stratified sampling. Another limitation was that although significant statistical differences were found in this study, the differences were not so considerable, thus caution should be exercised to interpret clinical significance. Large prospective longitudinal studies are needed to confirm the relationship between eating behavior and weight status and its associated factors in regard to controlling confounding variables. Also qualitative examination of eating behavior in children may provide insight into its possible relationship with obesity.

## CONCLUSION

Our data suggest that restrained and external eating behaviors are key factors in weight status. On the other hand, emotional eating behavior

could enhance weight gain. Understanding individual differences in eating behavior is the first step in planning the modifying programs.

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**Conflict of interest:** None declared

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