

Correlation of Obesity and Overweight with Emotional-Behavioral Problems in Primary School Age Girls in Tabriz, Iran

Bayanah Seyedamini¹, MSc; Ayyoub Malek^{2*}, MD; Mehrangiz Ebrahimi-Mameghani³, MSc, PhD, and Ali Tajik⁴, MD

1. Department of Nursing, Islamic Azad University, Mahabad branch, Mahabad, Iran
2. Department of Psychiatry, Tabriz University of Medical Sciences, Tabriz, Iran
3. Department of Nutrition, School of Public Health & Nutrition, Tabriz University of Medical Sciences, Tabriz, Iran
4. Faculty of Medicine, Tehran University of Medical Sciences, Tehran, Iran

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Abstract

Objective: Obesity and overweight have shown an increasing trend in most developing countries. Childhood obesity would impose numerous health-related problems. This study was conducted to determine the correlation of obesity and overweight with emotional-behavioral problems in primary school age girls.

Methods: In a cross-sectional study, 300 primary school girls (aged 7-11 years) were selected using a multi-staged sampling method, including randomized cluster and stratified method. For all students body mass index was measured and then based on BMI for age and sex, from each grade (1-5), 20 students were selected for each group of normal weight, overweight and obese. The emotional-behavioral problems were evaluated using child behavior checklist that consists of 113 items for childhood behavioral problems.

Findings: Total behavioral problems were seen in 17%, 27%, and 2% in obese, overweight, and normal weight children, respectively. Internalizing problems (including Anxious/Depressed, Withdrawn, and Somatic Complaints) were seen in 11%, 15%, and 2% and externalizing problems (including Aggressive and Delinquent Behaviors) were observed in 8%, 17%, and 2% in obese, overweight, and normal weight children, respectively. The mean scores in all scales were higher in obese and overweight children in comparison with normal weight children and the emotional-behavioral problems had significant positive correlation with obesity and overweight ($P<0.01$).

Conclusion: Despite the cultural differences between east and west, yet there are similarities in the most of the emotional-behavioral problems related to overweight and obesity. Also, it seems that the risk of behavioral-emotional problems in overweight girls is more than in obese girls. Overweight and Obesity prevention may be a primary preventive step for these problems in children.

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Key Words: Child Behavior Checklist; Obesity; Overweight; Psychological Factors; Behavior; Children

Introduction

Obesity and overweight have shown an increasing trend in most developing countries [1,2]. Currently obesity in adolescents and children is a major public health problem [3]. Obesity is a body fat excess condition. A weight increase of more

than 20 percent of ideal body weight is considered as obesity that is determined in children according to height, age, and sex [4].

Obesity is a multifactor complex disorder. Obesity is not a mental disorder, but is accompanied with serious important conditions [5] and would increase the risk of mental disorders [6].

* Corresponding Author;

Address: Child and Adolescent Psychiatric Ward, Department of Psychiatry, Razi Mental Hospital, El-Goli Blvd, POB: 5456, Tabriz, Iran
E-mail: maleka@tbzmed.ac.ir

Social label of obesity would have longstanding destructive effects on mental health [7]. Childhood obesity is interrelated with some undesired conditions; inaccurate perceptions of the need to diet, poorer self-perceived health status and potential social isolation, negative attitude toward appearance [8], aggression [9,10], depression, anxiety [11-13], attention deficit/hyperactivity disorder [14], behavioral problem [15], and bullying [9] are some obesity-related problems in schools. Body changes are important in experience of being different from peers and may result in decreased self-esteem and may be a barrier in social functioning [16]. Studies have shown that obese subjects have poor social functioning and social skills [17,18].

Psychological or behavioral problems in childhood have been examined as both causes and effects of overweight. That is, overweight has been hypothesized as a possible result of psychological symptoms, and psychological symptoms have been hypothesized to be a result of overweight [19,20]. Further evidence for the relationship between overweight and behavioral problems is provided by treatment studies that have shown decreased levels of psychological and behavioral problems in children subsequent to treatment for overweight [21].

Changes in nutritional habits and activities patterns, restriction of out of home activities, and cultural beliefs in some social classes about good effects of obesity and fat storage on health status are some causes of obesity and overweight in Iranian children [22,23]. Regarding the important role of cultural issues on the correlation of obesity and behavioral disorders [24] and lack of studies on emotional/behavioral problems among obese and overweight children despite more reports about the prevalence of obesity in Iran, this study was conducted to evaluate the correlation of obesity and overweight with emotional/ behavioral problems in children.

Subjects and Methods

Sample and procedure: This descriptive cross-sectional study was conducted to compare the behavioral/emotional problems among three groups (obese, overweight, and normal weight) of

primary school aged girls in Tabriz, Iran, during February 2008. Tabriz is one of the major and central cities in north-west Iran with a population of nearly 1.5 million. The proposal of the study was approved by the Regional Medical Ethics Committee of the Tabriz University of Medical Sciences. The sampling plans followed a stratified and multi-staged method. Sampling first was performed in a cluster manner and among primary schools of five districts in Tabriz City (based on the information of municipality and ministry of education) in which the life conditions and socioeconomic status is nearly the same. Authors randomly selected 1 school in each area, and in each school they visited all the students. The students were ranged from the first grade of primary school to the last (the fifth) grade of it. For all students BMI was measured and then based on BMI for age and sex, from each grade (1-5), 20 students were selected for each group of normal weight, overweight and obese. Totally 300 female students aged 7-12 years were selected. The children older than 12 years and with BMI lower than fifth percentile were excluded. Also the children with severe sensory-motor disorder or chronic disease, and those using psychotherapeutic drugs or drugs with effects on weight (such as corticosteroids) were excluded.

Measures: Obesity and overweight: To determine the BMI in each child, the authors measured height (by a wall-meter with accuracy of 0.5 centimeter) and weight (by a scale with accuracy of 100 gram) without shoes or jumpers. According to the Centers for Disease Control age- and gender-specific guidelines the body mass index (BMI) [weight (kg)/height(m)²] was calculated.

After estimating BMI, children were accordingly divided into three groups of obese, overweight, and normal weight. According to Centers of Disease Control and prevention (CDC), the children with BMI higher than 95th percentile were considered as obese, from 85th to 95th percentile as overweight, and 5th to 85th percentile as normal weight [3].

Behavioral problems: The behavioral problems were evaluated using child behavior checklist (CBCL). CBCL allows assessment of 113 parent-reported behavioral and emotional problems of children aged 4-18. Parents rate their child's behavior on a 3-point scale according to the behaviors of child in previous six months. The

CBCL includes 8 syndrome scales, a total problem score, and higher order Internalizing and Externalizing scales. Internalizing scales include Anxious/Depressed, Withdrawn, and Somatic Complaints. Externalizing scales include Aggressive Behavior and Delinquent Behavior. Three syndrome scales including Social Problems, Thought Problems, and Attention Problems, are not part of the internalizing/externalizing dimensions^[25]. It is a well known dimensional rating scale, in worldwide use, the psychometric properties of which have been reported in most countries including Iran. In terms of the psychometric properties of the Persian version of the CBCL, its internal consistency was 88%. The mean total score of the Iranian population was 27.5 which was in the range of other countries^[26].

A t-score over 65 was considered to indicate moderate to severe clinical impairment which is designed for childhood behavioral problems. The total score of 59 and less was considered as normal, 60-63 as borderline, 64-74 as clinical range, and 75 and higher as severe group^[27].

Data analysis: Data from 300 children were analyzed using SPSS [Statistical Procedures for

Social Sciences; Chicago, Illinois, USA] (version 11.5) software. Differences were tested by One-way ANOVA test and were considered statistically significant at *P*-values less than 0.05. Also the multivariate logistic regression analysis was performed.

Findings

Frequency of behavioral problems: Mean±sd age of the children was 9.01±1.41 years. Emotional and behavioral problems with scores in clinical range were observed in 11.7% for withdrawn, 9% for anxiety/depressed, 13.7% for delinquent problems, 2% for attention problems, 10% for thought problems, 3% for somatic complaints, 5.7% for social problems, 9.4% for internalizing problems, 9% for externalizing problems, and 15.3% for total behavioral problems.

Internalizing problems (including Anxious/Depressed, Withdrawn, and Somatic Complaints) were seen in 11%, 15%, and 2% and externalizing

Table 1: Mean scores of child behavior checklist scales for children based on body mass index

Behavioral problems	Normal weight		Overweight		Obese		<i>P</i> *
	Mean (SD)	CI 95%	Mean (SD)	CI 95%	Mean (SD)	CI 95%	
Withdrawn	2.62 (0.19) ^a	2.2-3.0	3.23 (0.21) ^a	2.8-3.6	3.06 (0.24)	2.6-3.5	0.04 ^a
Somatic complaint	1.04 (0.14) ^{a,b}	0.8-1.3	1.79 (0.23) ^a	1.3-2.2	1.95 (0.23) ^b	1.5-2.4	^a 0.01 ^b 0.002
Anxious/depressed	4.71 (0.26) ^{a,b}	4.2-5.2	6.4 (0.42) ^a	5.6-7.2	5.74 (0.38) ^b	4.97-6.5	^a 0.001 ^b 0.047
Social problems	3.64 (0.28) ^{a,b}	3.1-4.2	5.34 (0.36) ^a	4.1-4.6	4.63 (0.97) ^b	4.04-5.2	^a 0.003 ^b 0.03
Thought problems	2.14 (0.18) ^a	1.8-2.5	3.29 (0.27) ^a	2.8-3.8	2.75 (0.26)	2.2-3.3	^a 0.001
Attention problems	2.54 (0.20) ^a	2.1-2.9	3.42 (0.27) ^a	2.9-3.9	3.15 (0.26)	2.6-3.7	^a 0.012
Delinquent behavior	2.78 (0.16) ^{a,b}	2.5-3.1	4.11 (0.25) ^a	3.6-4.6	3.69 (0.23) ^b	3.23-4.15	^a 0.003 ^b 0.004
Aggressive behavior	4.48 (0.34) ^{a,b}	4.2-5.5	7.86 (0.57) ^{a,c}	6.7-8.9	6.25 (0.4) ^{b,c}	5.36-7.14	^a 0.0001 ^b 0.03 ^c 0.01
Internalizing	8.37 (0.44) ^{a,b}	7.5-9.2	11.42 (0.68) ^a	10.1-12.8	10.75 (0.7) ^b	9.4-12.1	^a 0.0001 ^b 0.002
Externalizing	7.62 (0.44) ^{a,b}	6.7-8.5	11.97 (0.76) ^{a,c}	10.4-13.5	9.94 (0.6) ^{b,c}	8.7-11.2	^a 0.01 ^b 0.006 ^c 0.01
Total score	27.24 (1.25) ^{a,b}	24.8-29.7	40.42 (2.18) ^{a,c}	36.1-44.7	34.6 (1.9) ^{b,c}	38.5-30.7	^a 0.0001 ^b 0.005 ^c 0.03

**P* for ANOVA; a=normal - overweight; b=normal - obese, c=overweight - obese; CI: Confidence Interval

Table 2: Correlations between obesity/overweight and behavioral problems

Variable	<i>r</i>	<i>P</i> *
Withdrawn	0.16	0.003
Somatic complaint	0.21	<0.001
Anxious/depressed	0.145	0.006
Social problems	0.144	0.006
Thought problems	0.138	0.008
Attention problems	0.165	0.002
Delinquent behavior	0.145	0.006
Aggressive behavior	0.139	0.008
Internalizing	0.211	<0.001
Externalizing	0.153	0.004
Total problem score	0.205	<0.001

**P* for Pearson correlation (1-tailed)

problems (including Aggressive and Delinquent Behaviors) were observed in 8%, 17%, and 2% in obese, overweight, and normal weight children, respectively. Total behavioral problems were seen in 17%, 27%, and 2% in obese, overweight, and normal weight children, respectively and the mean scores in all scales were higher in obese and overweight children in comparison with normal weight children (Table 1).

Correlations between obesity/overweight and behavioral problems: Regression analysis demonstrated a significant positive correlation between obesity and overweight status with all behavioral problems ($P < 0.01$) and increasing BMI was associated with increased problems in each scale (Table 2).

We first studied the association between overweight status and behavioral problems cross-sectionally. Then we used descriptive statistics and associations adjusted for potentially confounding factors that might be correlated with childhood overweight and children's mental health. For the multivariate analysis, we estimated a logit model with behavioral problems as the dependent variable and baseline overweight status as the right-hand side predictor variable. The first set of variables to control for confounding effects were standard socio-demographic variables: mother's educational level, birth order and watching TV duration. The second set included measures that might be directly related to psychological functioning: crisis experience during last six months, previous disease history, and birth weight. We included the child's birth weight because there is evidence that low-birth-

weight children may be at a greater risk for psychological problems [28]. After adjustment for confounding factors, the logit analysis showed a significant correlation between overweight/obesity and all behavioral-emotional problems except for withdrawn (Table 3).

Discussion

In this study we found that the mean scores in all scales of CBCL were higher in obese and overweight children in comparison with normal weight children. There was a significant correlation between obesity/overweight and vast majority of emotional-behavioral problems. As it is shown, one of the factors that can threaten child's life currently and in future is the risk of obesity and overweight [29]. Children and adolescents are preoccupied with their appearance, particularly their weight. As early as elementary school, children have negative images of obesity and desire to be thinner [30]. In majority of cultures the obesity in girls is associated with behavioral problems and changing trend in overweight status during the earlier years of school is a significant risk factor for negative outcomes in girls [31].

In most of previous studies, the mean score of behavioral-emotional problems in obese and overweight children was higher than in normal weight subjects [32]. Bruch and Touraine were the first authors to show an interest in the psychological functioning of obese children and

Table 3: Relationship between Obesity/Overweight and behavioral problems after adjustment for confounding factors

Behavioral problems	Unadjusted OR OR (CI 95%)	Adjusted OR OR (CI 95%)
Withdrawn	1.13 (1.00-1.27)	1.11 (0.98-1.26)
Somatic complaint	1.32(1.11-1.56)	1.3 (1.09-1.55)
Anxious/depressed	1.12 (1.04-1.21)	1.12 (1.04-1.21)
Social problems	1.16 (1.06-1.27)	1.16 (1.06-1.27)
Thought problems	1.02 (1.06-1.36)	1.18 (1.03-1.34)
Attention problems	1.14 (1.02-1.26)	1.13 (1.01-1.26)
Delinquent behavior	1.33 (1.16-1.54)	1.41 (1.13-1.51)
Aggressive behavior	1.13 (1.06-1.21)	1.13 (1.05-1.21)
Internalizing	1.09 (1.04-1.14)	1.08 (1.03-1.15)
Externalizing	1.12 (1.06-1.18)	1.11 (1.05-1.17)
Total problem score	1.04 (1.02-1.06)	1.04 (1.02-1.06)

OR adjusted for TV watch duration, crisis experience during last six months, maternal educational level, previous disease history, birth order, and birth weight. Reference group= Normal weight

adolescents in 1940^[33]. According to Dreyfus, 25% of obese children are free from psychological problems, 58% show no severe personality disorder, 15% have a personality disorder, and 2% display psychotic feature^[34]. More recent studies found more DSM-IV disorders in obese adolescents, while some authors noted more depressive symptoms and lower self-esteem in young obese patients^[35].

In contrast, there are some other researches which are not exactly consistent with the above-mentioned studies. Some investigators have shown a significant correlation between overweight and teacher-parent-reported externalizing and internalizing behavior problems at the beginning of kindergarten, only among girls. However, overweight status was not a risk factor for the onset of new behavioral problems over time for either girls or boys^[15].

A study reported that obese children (percentile higher than 95th) had a more risk for having clinical range of internalizing problems, somatic complaints, withdrawn, and social problems. But this study could not establish any correlation between externalizing behaviors such as aggression and obesity that might be due to inadequate chronic status of obesity for developing externalizing behaviors^[21].

Also, in a longitudinal study of Australian children, overweight 4-and 5-year-old children (born 1999-2000), had higher teacher-reported

conduct problems than did non-overweight children, but differences were small^[36]. In contrast, in an earlier Australian cohort of children born 1981-1984, no association between behavior problems and obesity was observed for boys or girls cross-sectionally at age 5, however at age 14, girls who were overweight compared to normal weight had over two times the odds of concurrent high levels of total behavior problems^[37]. In the Netherlands, conduct problems were not related to overweight among 5- to 6-year-old children studied during 2004-2005^[38].

The results of Kim and Park's study in 2009 showed that 1) approximately one-third of elementary school students expressed dissatisfaction with their height or weight, 2) there was no significant difference in total CBCL problem scores according to weight or height status, and 3) the prevalence of problematic cases was 3 percent and the CBCL problems score was dependent on school performance, but not on weight or height status^[39].

In summary, findings from the above-mentioned studies with regard to the relationship between obesity and behavioral problems in preadolescent children have not been consistent. This may reflect the cultural differences and different attitudes toward obesity and overweight in different cultures. Negative attitude toward obesity is going to be extended and such negative attitude would result in an increase in obesity-

related psychological problems^[40]. The suggested underlying factor for the increasing rate of childhood obesity in Iran is that still in our community plumpness is considered a sign of the child healthiness^[41]. Therefore, parents should be made aware of their child's obesity. If they cannot recognize the problem, they cannot or will not make an effort to treat it^[42].

Some mechanisms have been suggested for developing behavioral problems especially externalizing symptoms among obese children; it is reported that becoming a plaything of friends because of obesity had a positive correlation with externalizing and internalizing symptoms reported by parents^[43]. On the other hand, it is shown that externalizing behavior problems are associated with higher BMI and obesity in children as young as 24 months old. Among two-year-old children, irrespective of race, based on analyses one would predict an average difference of three-quarters of a BMI unit between children with high levels of externalizing behavior and children with low levels of externalizing behavior^[44].

These findings may indicate that biological mechanisms rather than environmental and cultural factors are responsible for developing behavioral problems in obese/overweight children.

The findings of our study may indicate that despite the cultural differences between east and west, yet there are similarities in the most of the emotional-behavioral problems related to overweight and obesity. This may reflect the existence of common aspects between different cultures or may emphasize on the biologic basis for the development of behavioral problems among obese/overweight children.

Our study also showed that the risk of behavioral-emotional problems in overweight girls is more than in obese and normal weight girls. The reason for this is not clear for us; may be the obese children, as a defense mechanism, deny or minimize their problems. Or they use more effective coping mechanisms than the overweight children in approaching their problems.

The present study had some limitations. Due to poor cooperation of teachers for filling the questionnaires, the behavioral problems were only evaluated by single information source, i.e. parents. However use of both sources would have given more definite results. Also, the study was

done among female students and the results may not be generalized to include male students.

Due to different attitudes toward obesity in various cultures our findings would not be applicable for other populations; similar studies in other cultures are suggested.

As the results of our study indicate, early recognition of overweight and obese children and referring them to consultation centers may be effective in prevention of emotional-behavioral problems.

This study was conducted among primary school children in whom the attention to physical appearance is less than in adolescents and so it is probable that with increase in age and weight of these children, the emotional-behavioral problems among them would increase. So follow up and evaluation of them in the next years and in higher educational levels is suggested.

Conclusion

Despite the cultural differences between different countries, yet there are similarities in the most of the emotional-behavioral problems related to overweight and obesity. Also, it seems that the risk of behavioral-emotional problems in overweight girls is more than in obese girls. The significant correlation between obesity/overweight and vast majority of emotional-behavioral problems in this study indicates a necessity for more surveillance about obesity/overweight and related complications. Overweight and obesity prevention may be a primary preventive step for these problems in children.

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Conflict of Interest: None

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