First report on body image and weight control in a nationally representative sample of a pediatric population in the Middle East and North Africa: the CASPIAN-III study

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Abstract

Introduction: This study explores the associations of weight perceptions with actual body mass index (BMI) and attempts to lose weight in a nationally representative sample of a pediatric population.

Material and methods: Data were collected from school students of 27 provinces in Iran, as part of "the national survey of school student high risk behaviors". We used *t*-test for continuous data and chi square test for categorical data. The correlation between categorical variables was assessed by Cramer's phi test. A multiple nominal logistic regression model was fitted to data to assess the association between perceived body weight and gender by adjusting for potential confounding variables.

Results: The study participants consisted of 5570 (2784 girls, 70% urban) students with mean age of 14.7 ±2.4 years. Overall, 17.3% of students were underweight, and 17.7% were overweight or obese. Nearly 25% and 50% of participants reported themselves as appropriate weight and very obese, respectively. In both genders, the strength of association between perceived weight and actual BMI was quite high (Cramer's phi coefficient = 0.5, $p < 0.0001$), and that of perceived body weight with trying to lose weight was moderate (Cramer's phi coefficient = 0.2, $p < 0.0001$). Overweight students were more likely than their obese peers to try to lose weight. After adjusting for possible confounders, the chance of perceiving oneself as very obese compared to perceiving oneself as very thin was 1.56-fold higher in girls than in boys, i.e. OR (95% CI): 1.56 (1.27-1.91).

Conclusions: This study revealed a considerably frequent "mismatch" between actual weight status and body shape dissatisfaction, which supports the necessity of increasing public awareness in this regard.

Key words: perceived overweight, weight loss, body image, children and adolescents.

Introduction

Obesity is a global problem, which is mainly related to lifestyle habits [1, 2]. Childhood obesity has become an emerging health problem in low- and middle-income countries [3]. A growing body of evidence exists on the health and psychosocial impact of obesity on adolescents [4, 5].

Adolescence itself is a developmental period characterized by greater autonomy, increased risk of exposure to social contexts e.g., peers, romantic relations, work, creating increased opportunities for health risk behaviors [6].

The "adolescent experience" may not be the same for all youths; this is of special concern for obese adolescents, who are more likely to suffer from psychiatric disorders [7], behavior problems [8], and social marginalization [9].

Youths, especially girls who are concerned about their weight status, are more likely to experience depressive symptoms than their overweight or obese peers who are not concerned about their weight [10].

Of all of the dimensions of social stratification, gender has a main role, because it influences the social norms and perceptions about physical appearance. Pervasive cultural ideals of female thinness, the stigma associated with being overweight, and traditional gender-role differences in the importance of attractiveness may contribute to the female's generally lower levels of satisfaction with their body weight [11].

The ways in which individuals evaluate their weight status might be a determinant of differences in lifestyle decisions as dietary and physical activity patterns.

Strong gender disparities exist in the prevalence of excess weight in developing countries, particularly in the Middle East and North Africa (MENA), where the prevalence of overweight and obesity is much higher in women than in men [12]. In addition to physical inactivity and high consumption of sugar-laden and calorie-dense foods, it is suggested that the existing cultural values in some countries in favor of larger body size among women as a sign of healthiness, prestige, fertility, and/or wealth have a pivotal role in the higher prevalence of excess weight in women than in men [13]. Nevertheless, some other studies in this region have reported considerably high prevalence of body image dissatisfaction and ultra-thin body image ideals in the young female populations [14, 15].

Limited experience exists among children and adolescents in the MENA region. Some small studies have proposed that the socio-cultural belief of admiring excess weight as a sign of the "good life" exists even in adolescents [16, 17].

Therefore, more research on the perception of children and adolescents about their weight status seems to be necessary. This study explores the associations of weight perceptions with actual body mass index (BMI) and attempts to lose weight in a nationally representative sample of a pediatric population in the MENA region.

Material and methods

Study population and data source

The data used in this study were collected as part of the "national survey of school student high risk behaviors" (2009-2010) as the third study of the school-based surveillance system [18] entitled Childhood and Adolescence Surveillance and Prevention of Iranian Adult Non-communicable Disease (CASPIAN-III) Study. Detailed methodology is explained elsewhere [19], and herein we describe it in brief. This school-based nationwide health survey was conducted in Iran with the cooperation of the Ministry of Health and Medical Education; the Ministry of Education and Training, Children's Growth and Development Research Center, Isfahan University of Medical Sciences; and the Endocrinology and Metabolism Research Institute of Tehran University of Medical Sciences in Iran. With regard to at least 2% changes in key indicators of the study and considering the α error of 5% and β error of 20% and considering the design effect equal to 1.25 for six groups according to age and gender, a sample size of 4950 students was calculated and with estimated 80% response rate, 20% was added to the sample size. This survey was performed among 5088 students aged 10-18 years who were recruited by multistage random cluster sampling from urban and rural areas of 27 provinces of Iran. Eligible schools for our study were stratified according to the information bank of the Ministry of Education and then they were selected randomly; in turn, in selected schools, students were also selected randomly.

Ethical issues

Study protocols were reviewed and approved by ethics committees and other relevant national regulatory organizations. After complete explanation of the objectives and protocols of the study for the students and their parents, we obtained written informed consent from parents and oral assent from students.

Procedure and measurements

We prepared the questionnaires in Farsi based on the World Health Organization (WHO) Global School Health Survey [20], and we also prepared some questions in a questionnaire prepared for parents. The validity of the content of all questionnaires was affirmed based on observations of an experts' panel and item analysis [18, 19].

Under the supervision of expert health care professionals, the students completed the self-administered questionnaire at school. The parents' questionnaire was given to students to be completed at home. The questions regarding the student perception of his/her weight status (too thin, a little thin, appropriate weight, a little overweight, and very obese) and the question whether he/she has tried to lose weight were used to assess the students' body image. Some questions concerning socio-demographic characteristics, e.g. living area (urban/rural), student's school type (public/private), parental level of education, type of house (private/rental), and possessing a family private car, were included in the parents' questionnaire [18, 19].

Physical examination

A team of trained health care professionals conducted the field examinations under a standard protocol by using calibrated instruments. Weight was measured to the nearest 100 g in barefoot and lightly dressed condition. Height was measured to the nearest 0.1 cm with the participant barefoot, standing with heels together and head positioned so that the line of vision was perpendicular to the body. Body mass index (BMI) was calculated as the weight (kg) divided by the height squared (m^2) [18, 19]. The BMI cutoffs from the Centers for Disease Control and Prevention (CDC) were used for classification of the children and adolescents as underweight (< 5^{th} percentile), normal (5^{th}–84^{th} percentile), at risk for overweight (85^{th}–94^{th} percentile) and overweight (≥ 95^{th} percentile) [21]. Our previous national study had confirmed that these cut-off points are appropriate to be used for Iranian children and adolescents [22].

Table I. Sociodemographic characteristics of the study population: the CASPIAN-III study

Variables	Gender		Value of *p*
	Boys (*n* = 2770)	Girls (*n* = 2744)	
Living area			0.24
Urban [%]	70.1	68.7	
Rural [%]	29.9	31.3	
School type			0.14
Public [%]	94.3	93.6	
Private [%]	5.7	6.4	
Type of house			0.36
Private [%]	80.4	80	
Rental [%]	19.6	20	
Possessing a family private car			0.42
Yes	49.8	49.5	
No	50.2	50.5	
Father's education [years]			0.28
< 3	14.2	15.5	
3-11	51.2	51.9	
12	25	23.1	
> 12	9.6	9.6	
Mother's education [years]			0.35
< 3	22	23.8	
3-11	52.2	51.9	
12	20.8	19.6	
> 12	5	4.7	

Statistical analysis

We used *t*-test for continuous data and χ^2 test for categorical data. The correlation between categorical variables was assessed by Cramer's phi coefficient. A multiple nominal logistic regression (MNLR) model was fitted to data to assess the association between perceived body weight and gender by adjusting for potential confounding variables. The results of MNLR are presented as the odds ratio and 95% confidence interval. Analyses were conducted using SPSS (version 16:0, SPSS Inc., Chicago, IL) software. A value of *p* of less than 0.05 was considered as statistically significant.

Results

In this survey, 2784 girls and 2786 boys as well as one of their parents were studied. The mean (SD) age was 14.68 (2.44) years among boys and 14.76 (2.37) among girls ($p = 0.23$).

Overall, nearly 70% of the population lived in urban areas and about 94% of students studied in public schools. The mean numbers of household members and children in each family were 5.19 and 3.57 persons, respectively. Most students lived with both parents. The fathers of 45.3% of students were workers and employees and 36.4% were self-employed. Most of their mothers (90.7%) were housewives. Most of the students' families (80%) lived in their own house, and nearly half of families possessed a car. Fathers and mothers of most students had an education level under or equal to high-school diploma (i.e. 12 years in Iran). Table I presents the main socio-demographic characteristics of the study population according to the students' gender, and does not reveal any significant difference between boys and girls.

Table II presents the unadjusted gender differences in BMI level. There was no difference in frequency of underweight between boys and girls, whereas boys were more likely than girls to be overweight or obese. This table also reports the gender differences in perceptions of body weight. Less than

a quarter of participants reported themselves as appropriate weight. Nearly half the students believed that they were obese. Girls were more likely to describe their weight as obese.

As presented in Table III, in both genders, the strength of association between perceived weight and actual BMI was quite high (Cramer's phi coefficient = 0.5, $p < 0.0001$). It can be assumed that half of the subjects did not have correct perception of their weight status.

Table IV shows that the strength of the correlation of perceived body weight with trying to lose weight was moderate among boys and girls (Cramer's phi coefficient = 0.2, $p < 0.0001$). Students who perceive themselves to be a little overweight were more likely to try to lose weight than their other peers. Most of the students who described their weight as obese did not try to lose weight. Overweight students were more likely than their obese peers to try a dietary plan for weight loss; among them girls were more likely to try to lose weight.

Table V presents the findings of the multinomial logistic regression analysis model on the association of perceived body weight and gender without adjustment and after adjustment for BMI, and after additional adjustment for living area, parental education, school type, type of house, and family ownership of a private car. In general, it shows that the perception of overestimating the weight status was higher in girls than in boys. After adjusting for possible confounders, the chance of perceiving oneself as very obese compared to perceiving oneself as very thin was 1.56-fold higher in girls than in boys, i.e. OR (95% CI): 1.56 (1.27-1.91).

Table II. Comparison of the body image and actual body mass index according to gender: the CASPIAN-III study

Variables	Boys *n* (%)	Girls *n* (%)	Total *n* (%)
Weight status			
Underweight	498 (17.5)	486 (17.3)	984 (17.3)
Normal	1775 (62.5)	1914 (67.4)	3689 (64.9)
Overweight	256 (9.3)	186 (6.5)	451 (7.9)
Obese	301 (10.6)	255 (9)	556 (9.8)
Perception about weight			
Perceived too thin	311 (10.9)	226 (7.9)	537 (9.4)
Perceived appropriate weight	584 (20.5)	651 (22.7)	1235 (21.6)
Perceived very obese	1303 (45.7)	1449 (50.6)	2752 (48.2)
Perceived a little thin	570 (20)	446 (16.3)	1036 (18.1)
Perceived a little overweight	84 (2.9)	70 (2.4)	154 (2.7)

Discussion

This study examined weight perceptions and attempts at weight loss in school students in Iran. To the best of our knowledge, this is the first study of its kind in a nationally representative sample of a pediatric population in the MENA region. We found that both among boys and girls, most normal weight individuals perceived themselves as overweight or obese, and on the other hand the perception of excess weight was less frequent in obese than in overweight persons. Cultural ideals or the stigma associated with thinness, or with being overweight, and traditional gender-role differences have considerable variations in different populations where variations in preferred body types exist. Most of the previous studies focused on Western populations, and the few studies conducted in non-Western countries included a small number of participants with little consideration of

Table III. Perceived weight and actual body mass index according to gender: the CASPIAN-III study

Gender	Perception about weight status	Underweight *n* (%)	Normal weight *n* (%)	Overweight *n* (%)	Obese *n* (%)	Phi coefficient	Value of *p*
Boys	Perceived too thin	117 (23.6)	159 (9)	16 (6)	12 (4.2)	0.58	< 0.0001
	Perceived a little thin	22 (4.4)	269 (15.2)	128 (48.3)	147 (51.4)		
	Perceived appropriate weight	195 (39.3)	335 (19)	16 (6)	30 (10.5)		
	Perceived a little overweight	3 (0.6)	16 (0.9)	10 (3.8)	54 (18.9)		
	Perceived very obese	159 (32.1)	988 (55.9)	95 (35.8)	43 (15)		
Girls	Perceived too thin	71 (14.7)	143 (7.5)	5 (2.7)	4 (1.9)	0.54	< 0.0001
	Perceived a little thin	13 (2.7)	230 (12)	90 (48.6)	119 (56.1)		
	Perceived appropriate weight	202 (41.8)	398 (20.8)	14 (7.6)	20 (9.4)		
	Perceived a little overweight	2 (0.4)	22 (1.2)	11 (5.9)	31 (14.6)		
	Perceived very obese	195 (40.4)	1117 (58.5)	65 (35.1)	38 (17.9)		

Table IV. Prevalence of perceived body weight and actual body mass index among boys and girls trying to lose weight: the CASPIAN-III study

Gender	Perception about weight	Tried to lose weight by diet plan		Phi coefficient	Value of *p*
		No *n* (%)	Yes *n* (%)		
Boys	Perceived too thin	289 (11.2)	12 (5.4)	0.22	< 0.0001
	Perceived a little thin	457 (17.7)	106 (47.7)		
	Perceived appropriate weight	559 (21.6)	19 (8.6)		
	Perceived a little overweight	68 (2.6)	17 (7.7)		
	Perceived very obese	1215 (46.9)	68 (30.6)		
Girls	Perceived too thin	203 (7.9)	10 (4.6)	0.21	< 0.0001
	Perceived a little thin	365 (14.3)	85 (39.4)		
	Perceived appropriate weight	605 (23.7)	31 (14.4)		
	Perceived a little overweight	49 (1.9)	17 (7.9)		
	Perceived very obese	1333 (52.2)	73 (33.8)		
	Body mass index category				
Boys	Underweight	478 (18.6)	15 (6.8)	0.21	< 0.0001
	Normal weight	1656 (64.3)	101 (45.7)		
	Overweight	217 (8.4)	47 (21.3)		
	Obese	224 (8.7)	58 (26.2)		
Girls	Underweight	455 (18)	23 (10.7)	0.20	< 0.0001
	Normal weight	1771 (69.9)	110 (51.2)		
	Overweight	151 (6)	31 (14.4)		
	Obese	157 (6.2)	51 (23.7)		

Table V. Association of perceived body weight and gender by using multinomial logistic regression analysis model[1]: the CASPIAN-III study

	Perceived body weight				
Gender (girls/boys)	Perceived too thin OR (95% CI)	Perceived a little thin OR (95% CI)	Perceived appropriate weight OR (95% CI)	Perceived a little overweight OR (95% CI)	Perceived very obese OR (95% CI)
Model 1[1]	Reference	1.10 (0.89-1.36)	1.53 (1.24-1.88)	1.11 (0.78-1.60)	1.51 (1.25-1.82)
Model 2[2]	Reference	1.24 (0.99-1.57)	1.52 (1.23-1.87)	1.20 (0.81-1.77)	1.60 (1.32-1.95)
Model 3[3]	Reference	1.28 (1.01-1.64)	1.41 (1.13-1.76)	1.25 (0.82-1.91)	1.56 (1.27-1.91)

In this model, perceived body weight was considered as the dependent variable and gender as the independent variable. [1]Without adjustment (crude model). [2]Adjusted for current body mass index. [3]Additionally adjusted for other characteristics including age, living area, parental education, school type, type of house, and family ownership of a private car

the impact of body image dissatisfaction in non-Western cultures.

Misperceptions about the need to gain or lose weight can have deleterious consequences for the motivation to implement weight-change regimens and other health behaviors. To examine the balance of 'over-concern', i.e. feeling overweight and trying to lose weight at low weights, and 'under-concern', i.e. not feeling overweight and not trying to lose weight at higher weights, according to gender. In the current study, in both genders, those who tried to lose weight constituted a smaller proportion than those who felt overweight. These issues can have long-term health consequences.

Adolescence is a critical period for reporting body dissatisfaction and the consequences of body image are significant in terms of developmental and clinical issues [23, 24]. Thus increasing public awareness by mass media, families, school health providers, and health professionals is necessary.

With increased awareness of overweight among youth in recent years, more links are established between overweight and social and emotional [25-27], academic [28-30], and physical health problems [31, 32] in youths and adults. Some studies

have suggested that the greatest risk for overweight children and youth is likely to be the persistence of excess weight into adulthood [33, 34]. Gender differences may persist into later life. As the population ages, weight-related concerns for elders may become an even more prominent part of well-being [35, 36].

Our findings suggest that body image is an important target of intervention to improve subjective health in adolescence, and that a large number of adolescents gave reports of body dissatisfaction. We found that the distribution of ideal body shape for students generally shifted towards slimmer body shape. This means that boys and girls generally perceive their current body shape fatter than what they desire.

There are two competing views on the relationship of actual physical status, e.g. BMI, and subjective body image evaluations. Some studies have revealed that BMI is an important determinant of body satisfaction [37-39], while others have argued that objective indices such as BMI are less important than psychological constructs such as self-esteem in affecting body dissatisfaction [40-42]. We identified the existence of a "mismatch" between actual weight status and body shape dissatisfaction. Normal BMI weight status individuals still desired a slimmer body. Those individuals who had achieved a healthy body mass were not necessarily more satisfied with their body shapes than those who were underweight. This mismatch is coherent with the fact that the desire for an ideal body shape is highly biased by sociocultural norms, environmental neighborhood affluence and media impact on individuals [43, 44].

Our finding about higher concerns of girls than boys about excess weight and poor body satisfaction is consistent with some studies in other countries [44-46]. Adolescents need help negotiating the socio-cultural determinants of body dissatisfaction.

Only less than one-fourth of overweight and obese individuals in this study were taking action to lose their excess weight. Across all countries, a substantial percentage of adolescents are thinking about weight control; this led to a hypothesis that dieting could be considered as a marker of other unhealthy behaviors and depressed mood in adolescence [47]. However, as found in our study, many youths with excess weight are not concerned with weight control.

Understanding of enhancement appraisals should be used to guide health promotion efforts on an individual's body image. Numerous experimental studies have shown that body dissatisfaction was increased by viewing or reading appearance-focused material or being exposed to peer messages about thinness [48-50].

Our study showed that 17.3% of the students were underweight, and 17.7% were overweight or obese. These findings support the epidemiologic transition and dual burden of nutritional disorders among youths in our community. Media-induced perception on the myth of a slimmer self-body image could be a possible factor underlying the desire of the slim ideal image and weight-loss behaviors. Those normal-weight and underweight individuals who desired to have a slimmer body shape could be a high-risk group for adverse health outcomes.

The extent of the problem, as defined by the current study findings, is certainly wide, although not directly evident, and needs proper attention both at school and within the family. Specifically, school health educators and school health service personnel might be of great help to address them with healthy weight, basic nutrition information, and to explain the benefits of a well-balanced diet meeting energy and nutrient needs for growth and development.

Because of the large population studied and the young age of participants, we could not assess the intrapersonal (e.g. pubertal development), and interpersonal (e.g. family relationships) factors affecting the development of body image. The novelty of conducting the survey in a large, nationally representative sample of youths, and the novelty in terms of the region under study, are the main strengths of this research.

In conclusion, this study revealed a considerably frequent "mismatch" between actual weight status and body shape dissatisfaction. The misperception of weight status and current body shape could be a major problem and increasing public awareness on healthy weight is necessary in different cultural backgrounds.

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