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New emerging correlates of weight satisfaction in women: husband-related factors and caffeine intake

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A B S T R A C T

Background: Weight satisfaction is an important determinant of weight-related behaviors and may result in overweight, obesity or eating disorders. To assess weight satisfaction and its related factors, including dietary intake and spouse-related factors, in adult women.

Methods: This is a descriptive-analytic cross-sectional study carried out in North of Iran. Through random sampling, 450 women aged 22-55 years under coverage of health centers were recruited from May 2012 to February 2013. Data were collected by face to face interviewing the individuals. Participants' height, and weight and waist circumferences were recorded. Body mass index (BMI) was calculated. We used the 24-hour recall questionnaire to estimate food intake in two days of the week. Weight satisfaction was evaluated through questioning. Multivariate logistic regression was used to determine the major factors related to weight satisfaction.

Results: Weight satisfaction was 62.4% among women. About 70% of women were overweight or obese (BMI≥ 25 kg/m2). The odds of weight dissatisfaction were higher in younger, healthy individuals and those who take more caffeine on a daily basis. Moreover, the odds of weight dissatisfaction were lower in underweight/normal weight (BMI< 25 kg/m2) women and the overweight women. In addition, the rate of dissatisfaction was significantly higher in women who believed their husbands are dissatisfied about their weight and women whose husbands were in fact dissatisfied about their weight.

Conclusion: Weight satisfaction was prevalent in participants and related to age, disease status, caffeine intake, BMI and husband-related factors.

Introduction

Obesity is more common among Iranian women compared to men, with 57% of adult women suffering from overweight or obesity [1]. Obesity is a risk factor for chronic diseases, including type 2 diabetes, cardiovascular diseases, hypertension, and certain malignancies [2]. Weight satisfaction reflects the degree to which a person's actual weight coincides with his/her desired weight [3], revealing the person's emotions and thoughts about their weight. Numerous studies across the world have attempted to elucidate body image and its related

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socio-demographic factors; few, however, have addressed weight satisfaction [4].

By definition, two states of weight satisfaction may be considered: satisfaction and dissatisfaction. Weight satisfaction may lead to accepting higher weight and ultimately, obesity. Weight satisfaction is common in developing communities, as previous studies suggest that more than 50% of all individuals were satisfied with their weight. The results from the first International Body Project (IBP-I) in 10 major world regions about body dissatisfaction showed BMI and Western media exposure as the main predictors of body dissatisfaction among women. In addition, body dissatisfaction was common in high-socioeconomic settings across world regions [5]. Recent evidence suggests that as time passes, people have grown more resistant to higher body weight. Given the worldwide increase in BMI over the last few decades, the concepts of obesity and appropriate body weight may change; as a result, accepting higher weight may delay diagnosis of obesity as a risk factor [6].

On the other hand, findings of some studies indicate that many women are concerned about their weight and body, and in globalization era weight dissatisfaction may mount a worldwide challenge [7]. Currently, weight dissatisfaction constitutes public health challenge, encompassing one third to more than half of the population in industrialized western countries [8]. Women in the US experience greater body dissatisfaction than women in other parts of the world.[5] The weight dissatisfaction increases the risk of stress, depression, low self-esteem, and risky health-related behaviors such as unhealthy diets leading to insufficient food intake and eating disorders [3]. Followed by obesity and asthma, eating disorders are the third common cause of disease in young populations in western countries [9].

Current evidence suggests that weight dissatisfaction may be less common in less developed or non-western societies. Some studies conducted in less developed countries suggest that overweight women may be favored [5]. A Malaysian study reported 63% weight satisfaction [10], while the same figures were 70% for Arab women and about 66% for Pakistanis and Sri Lankans residing in Norway [11,12]. An Iranian study revealed that 36% of overweight and 45% of obese women believed their weight is less than what it actually should be [13].

Weight satisfaction study has become currently popular, as it has the potential to promote weight controlling behaviors and improve nutrition and physical activity, and also serve as a control for preventing overweight and obesity [14]. Previous studies dealing with weight satisfaction in different countries reported influencing factors as age, literacy, occupation, marital status, residence, physical activity, income, socio-economic status, general wellbeing, weight-controlling practice, media, body mass index, fruit/vegetable intake, women belief about their husbands' satisfaction, and husbands' actual belief [4-6,11-22]. However, investigation about weight satisfaction and nutrient intake is scarcely reported. The result of one study showed nutrient intake between women who were satisfied and those who were not satisfied with their body image were similar [20]. Some other aspects of diet including caffeine intake may be related to weight change and hence, weight satisfaction/dissatisfaction. An inverse relation between caffeine intake and weight gain has been shown in various studies [22]. This study aims to evaluate weight satisfaction in women as well as to assess its relationship with dietary intake and husband-related factors, alongside the demographic and anthropometric variables.

Methods

This was a descriptive-analytic, cross-sectional study conducted in urban and rural areas of Noshahr township in north of Iran from May 2012 to February 2013. This study was carried out according to the principles of the Declaration of Helsinki and was approved by the Medical Ethics Committee at the Deputy of Research at Tehran University of Medical Sciences. The study population consisted of all women aged 20-55 years under coverage of health centers. Estimation of the sample-size was based on the percentage of misperception of weight status, which was reported as 50% in a previous study (9). The sample size was determined using p= 0.5, d= 0.05, α= 0.05 and the formula of $n= Z^2 P (1-P) / d^2$. Therefore, a sample size of 384 was obtained. In practice 450 women were recruited through random sampling. The number of samples required from each health center (a total of 12 centers) was determined based on ratio of people covered by the center. Pregnant and lactating women were excluded. General information were obtained through face to face interview by a trained

dietitian at the health centers. Health status perception was assessed with the question, "How would you rate your general health now?", with the answer options being "Good", "Fair", or "Poor". In order to determine the weight satisfaction, they were asked, "Are you satisfied with your weight now?", and in order to learn about their belief concerning their husband's opinion, they were asked, "What do you think about your husband's satisfaction about your weight now?". Moreover, the husbands were asked on the phone "Are you satisfied with your wife's weight now?" The answer options were "Very satisfied", "Somewhat satisfied", and "Dissatisfied". This method of assessment of weight satisfaction using the mentioned questions is recurred in other studies as well [4,11,15,16,18].

For the purpose of statistical analysis, the responses were categorized as satisfied or dissatisfied. All participants expressed their informed consent in written form prior to the study. This study was carried out according to the principles of the Declaration of Helsinki and was approved by the Medical Ethics Committee at the Deputy of Research at Tehran University of Medical sciences. Each participant signed an informed consent form prior to participation in the study.

Weight and height were measured with minimal clothing and without shoes. The individual's weight was measured to the nearest 0.1 kg using the weighing scale (Seca model 813, Germany), which was calibrated on a daily basis with known weights. Waist circumference was measured at the level of the midway between the lowest rib and the iliac crest. BMI was calculated as weight (kg) divided by the square of the height (meter). Women were classified as underweight/normal weight (BMI <25 kg/m^2), overweight (BMI 25.0-29.9 kg/m^2) or obese (BMI 30≤ kg/m^2).

We used the 24-hour recall questionnaire which covered two days in a week, including a working day. This questionnaire estimated the intake of energy, macronutrients, micronutrients, and fruit/vegetable servings. The questionnaire was administered face-to-face on the first day and over the phone on the other day. For 53 individuals, the food recall was documented for only one day, due to phone problems or poor collaborations. The questionnaires were completed by a dietitian. USDA food composition table was employed. Nutritionist version 4 was used to calculate nutrients intake.

For assessing physical activity levels of participants, we used the classified physical activity questionnaire according to metabolic equivalent task (MET) which included 9 activity levels from sleep/rest (METs= 0.9) to high-intensity physical activities (METs> 6). The validity of this questionnaire was approved using daily physical activity record questionnaire and also CSA accelerometer (Model 7164 Ambulatory Monitor) [23]. In Iran, the reliability and validity of this questionnaire was approved in a study by Kelishadi et al [24]. Hours spent on each physical activity were multiplied by their MET quantities and the numbers obtained were summed together to calculate MET Hour/day (MET.H/day) value.

Data analysis was achieved by SPSS software version 16 (SPSS Inc., Chicago, IL, USA). Kolmogorov-Smirnov test was used to assess the normality of distribution for quantitative variables. Independent student's t-test or Mann-Whitney test was used to compare means of respectively normally or non-normally distributed variables. Simple and multivariate logistic regression was used to determine the factors associated with weight satisfaction. All p values were based on two-tailed tests and compared with significance level of 0.05.

Results

Tables 1 and 2 summarize the characteristics of women participated in our study. Most of participants (61.3%) were rural. Overweight or obesity according to BMI was present in 50.8% and 20.2% of the sample respectively. About 62.4% of all women were satisfied with their weight and about 32.9% had previous attempts to lose weight. Most attempts included exercise and going on a diet. About 17.7% of women believed that their husbands are dissatisfied with their weight, while actually 30.3% of husbands were dissatisfied. Women dissatisfied with their weight had a lower daily mean intake of fruit/vegetables and higher mean intake of caffeine compared to women who were satisfied with their weight. The two groups were not significantly different in terms of mean macro- and micronutrient intake (Table 3).

Table 1. The characteristic of participants, Noshahr, 2012-2013

Characteristics	**Mean (SD)**
Age (years)	*35.0 (17.0)
Education level (years)	*9.0 (9.0)
Weight (kg)	69.9 (12.7)
Height (cm)	158.6 (6.0)
BMI (kg/m^2)	27.7 (4.9)
Waist circumference (cm)	91.6 (12.2)
Physical activity level (METs)	*38.7 (5.7)
Characteristics	**N (%)**
Marital status	
Single	75 (16.7)
Married	360 (80.0)
Widowed/divorced	15 (3.3)
Occupation	
Housewife	344 (76.4)
Employed	106 (23.6)
Residency	
Urban	174 (38.7)
Rural	276 (61.3)
BMI (kg/m^2)	
Underweight/normal weight (<25.0)	130 (29.0)
Overweight (25.0-29.9)	229 (50.8)
Obese (≥ 30.0)	91 (20.2)
Health status perception	
Good	261 (58.0)
Fair	146 (32.4)
Poor	43 (9.6)
Known disease	
No	413 (91.8)
Yes	37 (8.2)

*Data expressed as means±SD or median±inter-quartile range or N (%), *median (inter-quartile range)*

The findings of multivariable analysis revealed that the odds of weight dissatisfaction were significantly lower in women with underweight/normal weight or overweight compared to women with obesity in two models of logistic regression (Table 4). Moreover, the risk of weight dissatisfaction was lower in women who had made no attempts to lose or tried only to maintain their weight compared to those who tried to lose weight. Also, the odds of weight dissatisfaction were lower in women who assessed their general health status to be good or fair compared to those who gave a poor assessment. In the multivariable model which husband-related factors, fruit/vegetable servings and daily caffeine intake were included, the odds of weight dissatisfaction were higher in women who believed their husbands were dissatisfied with their weight (OR= 3.35, 95% CI: 1.40-7.99). In addition, weight dissatisfaction was higher in women whose husbands were actually dissatisfied with their weight compared to those women whose husbands were satisfied with their weight (OR= 2.59; 95% CI: 1.28-5.23). Also, in this model younger individuals were more likely to be dissatisfied compared to older women (OR= 2.05; 95%CI 1.03-4.06). People without a diagnosed disease were more likely to be dissatisfied compared to those with a disease (OR= 3.74; 95%CI 1.26-11.13). The odds of weight dissatisfaction were higher in women taking more caffeine on a daily basis (OR=1.005; 95%CI 1.001-1.010) (Table 4).

Discussion

The present study aimed to assess weight satisfaction and its related factors in women. The findings revealed that the odds of weight dissatisfaction were higher in younger individuals, the obese individuals, and those without diseases and those receiving more caffeine. In addition, weight dissatisfaction was significantly more frequent in women who believed their husbands were dissatisfied with their weight, as well as those whose husbands were actually dissatisfied with their weight.

Table 2. Women's weight satisfaction status and action for controlling weight and their husbands' satisfaction with women's weight, Noshahr, 2012-2013

	N (%)
Women's weight satisfaction status	
All women	
Satisfied	281 (62.4)
Dissatisfied	169 (37.6)
Over weight and obese women	
Satisfied	171 (52.3)
Dissatisfied	156 (47.7)
Action for controlling weight	
No action	251 (55.8)
Act to maintain weight	48 (10.7)
Act to lose weight	148 (32.9)
Act to increase weight	3 (0.6)
Kind of trying to lose weight	
Exercise	53 (11.7)
Diet	43 (9.5)
Exercise & diet	51 (11.3)
Exercise & diet & drug	1 (0.4)
No trying to lose weight	302 (67.1)
Women's opinion about husbands' satisfaction regarding women's weight status	
Dissatisfied	64 (17.7)
Satisfied	296 (82.3)
Husbands' satisfaction with women's weight	
Dissatisfied	109 (30.3)
Satisfied	251 (69.7)

Women's perception of their husbands' opinion was better correlated to the women's satisfaction than their husbands' actual satisfaction. This finding suggests that the women's belief, even wrong, may play a more critical role in their weight satisfaction.

The relationship between weight satisfaction and BMI has been reported in many studies. In line with our findings, other studies indicate that higher BMI is related with body size dissatisfaction [4-8,10-22]. The relationship between weight satisfaction and intake of macro- or micronutrients has rarely been studied before [6.20,21]. Nutrients may affect body weight and thus weight satisfaction [20]. In the present study, the odds of weight dissatisfaction were lower in women who received more fruit/vegetables before correcting for confounding factors. Other studies also indicate that lower levels of fruit/vegetable intake are associated with poorer body satisfaction [6,20]. This relationship, however, lost significance in multivariable regression analysis. Moreover, weight dissatisfaction was more likely in women who took more caffeine. This is a novel finding, not previously mentioned in any study. The higher intake of caffeine in women with weight dissatisfaction may reflect higher consumption of caffeine-rich condiments, including coffee, tea, and soft drinks, etc. In order to achieve a better understanding of this matter, we assessed the daily intake of tea in weight-dissatisfied women (2 cups) versus weight-satisfied women (1.8 cups), and obtained a significant difference ($p= 0.03$). On the other hand, the two groups were not significantly different in terms of daily soft drink intake and daily intake of coffee was negligible. It is conceivable that weight-dissatisfied women try to consume more tea instead of food in order to prevent weight gain. However, their intake of energy was not different from the weight-satisfied women. This subject needs further studies to be fully elucidated. Lack of a correlation between weight satisfaction and nutrient intake may reflect the biased estimations of food intake through 2-day per week food recall interviewing [25]. Overweight and obese women have been indicated to underreport food intake, especially in the case of calorie-rich foods [26]. Other weaknesses of the 24-hour recall questionnaire (i.e. different capabilities of individuals in describing food amounts, memory bias caused by age or low education, over- and

Table 3. Women's weight satisfaction status and dietary intake adjusted for energy intake, Noshahr, 2012-2013

	Weight satisfaction status				
Daily intake	**Dissatisfied n=169**		**Satisfied n=281**		**p-value**
	Mean	SD	Mean	SD	
Protein (g)	+71.7	#14.7	+72.2	#16.3	*0.4
Fat (g)	61.7	16.0	60.4	14.6	†0.3
Carbohydrate (g)	282.9	39.4	282.0	37.3	†0.8
Saturated fatty acid (g)	+12.8	#8.9	+12.6	#8.9	*0.4
Cholesterol (mg)	+173.8	#115.1	+165.8	#123.6	*0.7
Iron (mg)	+12.1	#4.9	+11.6	#5.0	*0.09
Magnesium (mg)	+179.3	#78.4	+173.4	#87.6	*0.3
Zinc (mg)	5.7	2.2	5.6	2.6	†0.8
Calcium (mg)	+515.8	#247.3	+529.2	#239.0	*0.7
Copper (mg)	+0.79	#0.41	+0.75	#0.43	*0.2
Selenium (mg)	+0.07	#0.07	+0.07	#0.06	*0.1
Vitamin A (RE) ‡	+354.9	#401.6	+353.3	#355.3	*0.9
β carotene (µg)	+152.2	#175.7	+152.2	#204.2	*0.9
Vitamin E (mg)	+2.9	#3.5	+2.5	#2.9	*0.1
Vitamin C (mg)	+51.9	#53.7	+55.6	#49.8	*0.8
Thiamin (mg)	1.5	0.5	1.5	0.5	†0.6
Niacin (mg)	16.1	5.5	16.5	6.4	†0.5
Riboflavin (mg)	+1.07	#0.3	+1.06	#0.4	*0.3
Pyridoxine (mg)	+1.10	#0.5	+1.14	#0.5	*0.4
Cobalamin (µg)	+1.26	#1.21	+1.24	#1.24	*0.8
Folat (µg)	+158.0	#83.2	+148.0	#105.1	*0.2
Dietary fiber (g)	+8.9	#5.7	+9.5	#6.1	*0.9
Caffeine (mg)	+75.0	#69.2	+67.3	#59.20	*0.04
Fruit & vegetable (serving)	+3.0	#2.0	+3.5	#2.0	*0.04

**p-value for Mann-Whitney test (distribution)*
†p-value for Independent t-test (mean)
‡Retinol equivalent
Data showing means ± SD or median ± interquartile range, +median, #interquartile range

underreporting) may account for this, as well [20].

Among our participants, women who thought their husbands were unhappy about their weight were more likely to be weight-dissatisfied compared to the women who believed their husbands were satisfied with their weight. This is consistent with studies on female weight dissatisfaction and the role of husbands in US [15,17]. One study on women employed in Iranian health centers revealed a correlation between women's beliefs and that of their husbands: women who believed their husbands have a correct or underestimated assessment of their weight were less likely to overestimate their own weights compared to women who believed their husbands overestimate their weight [27].

Furthermore, women whose husbands were actually dissatisfied with their weight were more likely to be weight-dissatisfied compared to women whose husbands were actually satisfied with their weight. Similar to our findings, the spouses' mutual weight satisfaction was shown to be highly correlated in black individuals whereas white men were more satisfied with their wives' weight than the wives imagined. In fact, white women were more likely to be weight-dissatisfied due to incorrect beliefs [15].

Interestingly in our study, women had a higher assessment of their husbands' satisfaction with their weight than what was actually happening, which is inconsistent with other studies [15,17]. In fact, 30.3% of men were dissatisfied with their wives' weight, while only 17.7% of women believed that their husbands are dissatisfied. This may be the result of the couple refraining from discussing weight satisfaction, and leaving women unaware of their husbands' actual opinion. In addition, it is possible that the husbands prefer not to criticize their wives' weight or talk about it, giving rise to a more positive opinion among women than the actual situation. A study in the United States dealing with the role of husbands in women's body satisfaction found no significant

Table 4. Association between weight dissatisfaction in women and independent variables in multivariable logistic regression model, Noshahr, 2012-2013

	Adjusted OR† (95% CI‡)	p-value
Model 1§		
BMI (kg/m^2)		
Underweight/normal weight (<24.9)	0.06 (0.02-0.17)	<0.001
Overweight (25.0-29.9)	0.27 (0.14-0.52)	<0.001
Obese (≥ 30.0)	1	
Action for controlling weight		
No action	0.52 (0.32-0.86)	0.01
Act to maintain weight	0.21 (0.08-0.55)	0.002
Act to lose weight	1	-
Health status perception		
Good	0.43 (0.19-0.99)	0.04
Fair	0.69 (0.30-1.57)	0.3
Poor	1	
Model 2§		
Age (year)		
20-30	2.05 (1.03-4.06)	0.04
30 <	1	-
BMI (kg/m^2)		
Underweight/normal weight (<25)	0.08 (0.02-0.28)	<0.001
Overweight (25.0-29.9)	0.34 (0.16-0.72)	0.005
Obese (≥ 30.0)	1	-
Known disease		
No	3.74 (1.26-11.13)	0.01
Yes	1	-
Women's opinion about husbands satisfaction		
Dissatisfied	3.35 (1.40-7.99)	0.006
Satisfied	1	-
Husbands' satisfaction with women's weight		
Dissatisfied	2.59 (1.28-5.23)	0.008
Satisfied	1	-
Caffeine intake	1.005 (1.001-1.010)	0.02

†Odds Ratio, ‡ Confidence Interval, §Adjusted for residency, age, education level, marital status, occupation, physical activity level, BMI, waist circumference, health status perception, known disease, action for controlling weight, women's opinion about husbands satisfaction, husbands' satisfaction with women's weight, servings of fruit and vegetable intake and caffeine intake.

relationship between weight satisfaction in women and the husbands' actual satisfaction [17].

The odds of weight dissatisfaction were higher in women who were not ill. A study in Denmark revealed that people with asthma, pulmonary disease, and low back pain tend to be more weight-dissatisfied [9]. Obesity and overweight contribute to chronic diseases, and thus such a correlation can be justified. In our study, the higher rate of dissatisfaction among women without diseases may be caused by the small number of individuals who declared their disease. However, there may be a need for more precise disease classification and patient evaluation by the doctor.

Consistent with other studies, our findings indicate that younger women tend to be more dissatisfied with their weight [4-8,10-21,28-30]. Younger women are more eager to be in shape. Moreover, it has been shown that body dissatisfaction remains constant in older ages in women. Acceptance of higher weight with increasing age and lowered gullibility against media influences in older people are the possible causes [8].

Women who had attempted to lose weight were more likely to be dissatisfied with their weight compared to those who had not tried to lose weight or only sought to maintain their weight. Other studies have indicated that weight dissatisfaction encourages activities to lose weight [4,6,19]. On the other hand, overweight or obesity promotes body dissatisfaction, and any activity that lowers weight will consequently yield better satisfaction [28].

In the current study, 71% of the obese individuals were dissatisfied with their weight. Nevertheless, more than half of them did nothing to lose weight. A study in US indicated that women with higher BMI were more dissatisfied with their weight with less walking and fruit/vegetable intake, yet they were less eager to change their diet and lose weight [6]. Still, weight dissatisfaction may be used as an auxiliary measure when designing interventions or programs for weight loss in overweight/obese women. About 62.4% of women in the present study were satisfied with their weight, which is similar to findings reported from Swiss, Pakistan, Sri Lankans residing in Norway, and Jewish and Arab women of Israel [8,11,12]. Weight satisfaction was 50%, 52% and 75% in women of Iceland, Germany and the USA, respectively [4,9,16]. The reason behind these discrepancies may be the differences in study populations, weight status, or methods of assessing weight satisfaction.

Weight satisfaction was lower in overweight/obese women compared to the overall rate (52% versus 62%). In fact, weight dissatisfaction was more common in overweight/obese women, although a study performed in US indicated that merely 1% of obese women were satisfied with their weight [6], suggesting that the society still has a high rate of weight satisfaction among obese women. We observed a high rate of obesity and overweight (71.4%), yet only 48% of women with overweight/obesity were dissatisfied. Considering the high prevalence of obesity and overweight in the population, this should alarm us to the danger of higher BMIs becoming acceptable by women. This reflects the paradox between weight satisfaction and actual weight in women, where despite overweight/obesity, women may not necessarily be dissatisfied with their body.

Our study had certain limitations. First, the cross-sectional nature of the study prevented any causal judgment between weight satisfaction and the related factors. In addition, reports of food intake are subject to recall bias. Nevertheless, this was one of the few studies worldwide which addressed nutrient inta ke and husband-related factors with regard to weight satisfaction. Besides, this was among few studies considering the effect of body fat distribution in assessing the individual's weight satisfaction.

Conclusion

In general, it may be stated that despite the high prevalence of obesity among women, many of them are satisfied with their weight. Our findings indicated that after controlling all other factors, weight satisfaction is related to age, disease status, daily caffeine intake, BMI and husband-related factors. These findings suggest that when planning for interventions aimed at attitude correction and weight reduction for women, it is necessary to consider husband-related factors, as well. Also, there is a need for more precise assessment of weight satisfaction in other parts of the country.

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