

## Perceived Barriers to Weight loss Programs for Overweight or Obese Women

Nasrin Sharifi<sup>1</sup>, \*Reza Mahdavi<sup>2</sup>, Mehrangiz Ebrahimi-Mameghani<sup>3</sup>

<sup>1</sup> Department of Nutrition, Faculty of Paramedicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

<sup>2</sup> Nutrition Research Center, Faculty of Nutrition, Tabriz University of Medical Sciences, Tabriz, Iran

<sup>3</sup> Department of Nutrition, Faculty of Nutrition, Tabriz University of Medical Sciences, Tabriz, Iran

### ARTICLE INFO

#### Article type:

Original Article

#### Article history:

Received: Aug 8 2012

Accepted: Nov 08 2012

e-published: Jun 30 2013

#### Keywords:

Barriers,  
Diet,  
Physical activity,  
Overweight,  
Obesity

#### \*Corresponding Author:

Reza Mahdavi

Tel: +98 411 3357580;

e-mail:

mahdavirez@hotmail.com

### ABSTRACT

**Background:** In order to develop appropriate obesity control and treatment strategies, the key point is to understand the barriers perceived by overweight or obese people in trying to follow weight-loss programs. This study examined perceived barriers to weight-loss programs among overweight or obese women.

**Methods:** In this descriptive-analytical study, 204 overweight or obese women aged  $31.97 \pm 10.62$  yr, were selected randomly from the nutritional counseling centers in 2008 in Tabriz, Iran. The mean BMI was  $33.83 \pm 5.75$  kg/ m<sup>2</sup>. A structured questionnaire including questions on barriers to weight-loss diet and physical activity was filled out for each participant by face-to-face interview. Height and weight measured objectively and demographic details were obtained. Data analysis carried out using multiple regression and factor analysis.

**Results:** The most important perceived barriers to weight-loss diets were 'situational barriers', stress, depression, and food craving. High educational level was independent determinant of situational barriers ( $\beta=0.329$ ,  $P=0.048$ ). Employee women had a higher mean score on stress and depression than students and housewives. Lack of time and exercising lonely were the most important items of "External barriers" and Lack of motivation was the most important item of "internal barriers" to physical activity. Employment and being student were highly associated with external barriers ( $\beta=1.018$ ,  $P<0.001$  and  $\beta=0.541$ ,  $P=0.002$ ). Moreover, older women who had low educational level, perceived more internal barriers.

**Conclusion:** Weight reducing strategies should take into account the specific perceived barriers to weight-loss diets faced by overweight or obese women, particularly situational barriers, stress and depression and food craving; and lack of time and lack of motivation as barriers to physical activity.

**Citation:** Sharifi N, Mahdavi R, Ebrahimi-Mameghani M. Perceived Barriers to Weight loss Programs for Overweight or Obese Women. Health Promot Perspect 2013; 3(1): 11-22

## Introduction

Overweight and obesity have reached epidemic proportions, not only in developed but also in developing countries<sup>1</sup>. In Iran, a Middle-East developing country, prevalence

of overweight and obesity is 42.8% in men and 57.0 % in women<sup>2</sup>. Obesity is also more common among women than men (25.2% vs.11.1%)<sup>2</sup>. North-west of Iran is an area with

higher prevalence of overweight and obesity in compare to the nationwide prevalence<sup>3</sup>. Based on the above information, it is necessary to establish proper preventive health practices and treatment strategies in order to reduce the rate of obesity. However, according to the health belief model<sup>4</sup>, the presence of perceived barriers decreases the likelihood of engaging in preventive health practices. One of the most important preventive health practices to reduce the rate of obesity is weight loss programs<sup>5</sup>. Dietary changes and exercise are major components of weight loss interventions in Iran. Therefore, perceived barriers to weight loss programs may refer to an individual evaluation of the potential obstacles that may lessen the adherence to mentioned interventions<sup>6</sup>. The most of previous studies<sup>7-9</sup>, examined perceived barriers to healthful eating. For example, in one study the most common perceived barriers to healthy eating were related to motivation, time and cost<sup>7</sup>. Time and taste factors were the most frequently mentioned perceived barriers to healthy eating in Kearney et al study<sup>8</sup>. In Spain, the main barriers were 'irregular work hours', 'willpower' and 'unappealing food'<sup>9</sup>. When it comes to physical activity, the most important barriers reported in studies were lack of motivation, lack of time due to work or study commitment and lack of family or friend support<sup>7,10-12</sup>. Few studies specifically considered the perceived barriers to healthful eating by obese adults who participated in weight-loss programs<sup>13-15</sup>. Lack of knowledge, lack of control and lack of time were the perceived barriers reported by the obese treatment-seeking adults in Welsh et al study<sup>13</sup>. However, it seems that different social and cultural factors of societies may affect perceived barriers. Most previous studies have been performed in developed countries and less is known about perceived barriers to weight loss programs in developing ones such as Iran.

Therefore, this study was carried out to examine perceived barriers to weight-loss pro-

grams among overweight or obese women in Tabriz, Iran.

## Materials and Methods

Present research was descriptive-analytical study conducted in 2008 and participants were attendants of the nutritional counseling center, which is a part of specialized clinics network at the Tabriz University of Medical Sciences, Tabriz, Iran. The inclusion criteria were ages above 18 yr, body mass index (BMI) greater than 25 kg/m<sup>2</sup> and not being pregnant or athlete. Considering the dropout rate (15.5%) in the previous weight loss program in the region<sup>16</sup> we calculated our study sample size to be 200 at 95% confidence level and a margin of error equal to 0.05 plus an extra 100 subjects to cover potential withdrawers.

The present study had two parts. In first part, a questionnaire about demographic variables and anthropometric data was filled out from participants at study entry and before the first session of nutritional counseling. Second part was completed when participant gave up continuation the program in less than two months or after that in subjects who keep on attending the nutritional counseling center. In first part, 300 women recruited by using the mentioned inclusion criteria and simple random sampling procedure. Nevertheless, 56 subjects were excluded from the study because of several reasons unrelated to weight loss program such as changing their living area or wrong phone number. In addition, the other 40 subjects gave up completing the second part (filling out the barriers' questionnaire) because of personal reasons. Therefore, 204 subjects remained in the study and completed both parts of the research.

Part I: A questionnaire about demographic variables was filled out by face-to-face interview at study entry. Demographic variables included age, marital status, job status (housewife, employee and student) and educational levels (primary school, high school and university). Height was measured to the

nearest 0.5cm with subjects standing bare feet, heels together, and head in horizontal Frankfurt plane. Body weight was measured to the nearest 0.1 kg using a Seca scale, and subjects wearing light indoor clothes. BMI was calculated as weight (kg) divided by square of height (m<sup>2</sup>) and classified as overweight (BMI > 25 kg/ m<sup>2</sup>) or obese (BMI > 30 kg/ m<sup>2</sup>). Then participants were referred to the nutritionist in nutritional counseling center to start weight loss program. Weight loss diets were designed by nutritionist based on scientific recommendations. The sample weight loss diets were analyzed and following results were obtained: The recommended energy ranged from 800 to 1500 Kcal per day. The recommended diets contained 20% of calories from protein, 55% from carbohydrates and 25% from fat. Participants were advised to have at least 30 minutes physical activity of moderate intensity every day.

Part II: This part of study was completed by either participant who had continued weight loss programs for two months or participants who stopped attending the nutritional counseling center in less than two months. Women's perceptions of barriers to follow weight-loss diet and be physically active were assessed using 26 items structured questionnaire, which was validated by pilot study in 30 overweight or obese women.

### ***Pilot study***

To develop perceived barriers questionnaire, literature review of articles (identified by a search of the Medline) was performed initially. Next, some of the barrier items were extracted from these articles. Then, these items tested in a number of women clients of nutritional counseling centers. In order to determine other important barriers to follow weight-loss diet and physical activity which may not have been included in the barriers items, participants were asked the following two open-ended questions: "What is the one thing that makes it hardest for you to compliance with a weight-loss diet?" and "What is

the one thing that makes it hardest for you to be physically active?". Finally, the article-extracted barriers and those mentioned by participants were put together, revised, and restructured to 26 questions with clear, understandable and familiar words. This perceived barriers questionnaire was pilot-tested with a convenience sample of 30 overweight or obese women clients of those nutritional counseling centers in order to determine inter-item reliability. The Cronbach's  $\alpha$  coefficient for the barriers' questionnaire was 0.80, indicating good internal reliability. During the pilot study it was founded that subject started to report barriers approximately 6 to 8 weeks after the onset of weight loss program. Subsequently, the two months period was considered sufficient for assessing barriers to weight loss program adherence.

In part II, the questionnaire was filled out by a trained interviewer (face to face interview) and started with this sentence: "The following is a list of possible barriers that keep people from adhering to a weight-loss diet or being physically active". Then, for each item, participants were asked to characterize its importance using a 5-point Likert scale (1= not a barrier, 5= the most important barrier). There were two sets of perceived barriers, those related to weight-loss diet (17 questions) and those to physical activity (9 questions).

### ***Statistical Analysis***

Analysis was conducted, using SPSS version 11.5 statistical software. Two separate exploratory factor analysis were performed with the 17 barriers to follow weight-loss diet and the 9 barriers to physical activity, to identify underlying structure of the data. Principal components analysis with varimax rotation was used. The factorability of the matrix was determined using the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO)<sup>17,18</sup>. The KMO for the entire matrix was 0.735, which fell into the range of being good. Only factors with Eigenvalues over 1.0 were extracted. A factor-loading cutoff of 0.4 was

adopted and items that had loading of less than 0.4 were dropped. Items included in each factor were reviewed for content consistent with the other items within the factor. Individual statements that did not appear consistent with the concept defined by the factor were omitted from the list of items. The mean factor scores were calculated for each factor by averaging the Likert scores of individual items that composed each factor and used to rank order the barrier factors from the most important to the least important. Multiple linear regressions using the backward technique were used to determine relationships among perceived barriers, demographic variables and overweight or obesity status. Demographic variables and BMI selected as independent variables while the mean standardized of each factor scores selected as dependent variables. Data concerning factor scores, age and BMI were entered in the model as continuous variables, while the variables of marital status, job status and educational levels were entered in the model as dummy variables. *P* values < 0.05 were considered statistically significant.

## Results

The mean age of overweight or obese women was  $31.97 \pm 10.62$  years (range 18 to 50 years). Approximately, 26% of the respondents were university-educated and 41% were high school graduated. Two third of them were married (66.6%). From occupational point of view, 68.4%, 11.9% and 19.7% were housewives, employee and student, respectively. The mean BMI was  $33.83 \pm 5.75$  kg/m<sup>2</sup> and 68% of the subjects had a BMI greater than 30 kg/m<sup>2</sup>.

The factor analysis of the perceived barriers to weight loss diet revealed six interpretable factors with Eigenvalues greater than one. These factors together explained 61% of total

variance. Evaluation of the barriers' items within each factor revealed that one of the original 17 items -" do not reach desirable weight loss"- had Eigenvalue less than 0.4 and was omitted. Provisional names were assigned for these six factors, which are presented in Table 1. Furthermore, two factors were identified accounting for 44% of the total variance in perceived barriers to physical activity. One barrier item- "not being able to exercise because of cold weather"- did not load on any of the two factors and omitted from the list of items. These two factors named "external barriers" and "internal barriers" are presented in Table 2.

The single most important barrier to follow weight- loss diet was situational barriers (Table 3).

Stress and depression, food craving and social barriers were the next important barriers. Moreover, "external barriers to physical activity" had higher mean score than internal barriers. The most four important items of barriers to follow diet were "traveling", "sweet tooth", "being at a party" and "being in stress"( Mean Likert score 3.18, 2.87, 2.81, 2.73 respectively). Respondents rated lack of time due to work or study, lack of motivation and exercising lonely as most important items of barriers to physical activity (Mean Likert score 2.58, 2.57, 2.42 respectively).

The results of the multiple regression analysis presented in Table 4. These variables accounted for a small percent of the variance (*R*<sup>2</sup>) in each factor. The analysis revealed that educational levels were independent determinants of situational barriers and cost of diet. Women with university degree had a higher score on situational barriers than those with high school and primary school education. Further, the less educated, the more barriers reported by women on cost of diet.

**Table 1:** Perceived barriers to weight-loss diet adherence and items loaded on them with factor loads in overweight and obese women (n=204) \*

Barriers to follow weight-loss diet	Factor loading†
<b>Factor 1: Situational Barriers ( Eigenvalue = 3.62, 21.3 % variance )</b>	
Eating out kept me from adhering to weight-loss diet.	0.77
I can not follow diet while I am at a party.	0.76
It is hard for me to stick with diet when I am on a trip.	0.59
<b>Factor 2: Stress and Depression (Eigenvalue = 1.77, 10.4 % variance)</b>	
I can not follow diet when I am blue.	0.89
I can not continue diet when I am in stress.	0.88
<b>Factor 3: Social Pressure ( Eigenvalue = 1.48, 8.7% variance )</b>	
My family does not support me to follow weight-loss diet.	0.70
My friends pressure me to eat something.	0.67
I can't follow diet when my food pattern differs from that of other family members.	0.56
<b>Factor 4: Adverse Effects of Weight-Loss Diet (Eigenvalue = 1.27, 7.45% variance)</b>	
Feeling to have a pale appearance, keep me from following diet.	0.81
I could not follow my diet because of Its complication.	0.76
I could not adhere to diet because I felt hungry most of the time.	0.45
<b>Factor 5: Food craving (Eigenvalue = 1.14, 6.7 % variance )</b>	
I like junk foods a lot and whenever they are available, I can't resist eating.	0.68
Dietary foods are not delicious, then I can't follow diet completely.	0.63
I break my diet when sweets, chocolate, candy, cake and biscuit are available.	0.56
<b>Factor 6: Cost of diet (Eigenvalue =1.05, 6.2 % variance )</b>	
Weight-loss diet and healthy foods are expensive.	0.78
Weight- loss diet is boring.	0.42

\* Factors extraction procedure: *Principal Component Analysis*, Component rotation procedure: *Varimax Rotation*/

†Cutoff point: 0.4

**Table 2:** Perceived barriers to physical activity and items loaded on them with factor loads in overweight and obese women (n=204) \*

Barriers to physical activity	Factor loading†
<b>Factor 1: External Barriers ( Eigenvalue = 2.74, 30.4 % variance )</b>	
I don't have enough time to be physically active because of job or education.	0.80
I am too tired to exercise.	0.71
I don't have enough time to be physically active because of house working.	0.56
There is no one to exercise with me.	0.53
I don't have access to places to do physical activity, exercise or sport.	0.52
<b>Factor 2: Internal Barriers (Eigenvalue = 1.23, 13.6 % variance)</b>	
I can not exercise because of foot pain.	0.78
It is hard for me to be physically active because of high weight.	0.73
I'm not interested in being physically active or doing exercise regularly.	0.42

\* Factors extraction procedure: *Principal Component Analysis*, Component rotation procedure: *Varimax Rotation*/

†Cutoff point: 0.4

Only the employment was significantly associated with 'stress and depression'. In fact, employees had a higher standardized mean

score on stress and depression than students ( $0.34 \pm 1.08$  vs.  $-0.2 \pm 0.92$ ,  $P < 0.05$ ) but not significantly than housewives ( $0.34 \pm 1.08$  vs. -

0.03±0.97,  $P < 0.05$ ). Moreover, employment was associated with social pressure. Finally, BMI was negatively correlated with situational

barriers, social pressure and food craving (Table 4).

**Table 3:** Priority of barriers to weight-loss programs based on mean Likert scores for each factor in overweight and obese women (n=204)\*

Barriers factors to weight-loss diet	Mean(SD)
Situational Barriers	2.86(0.29)
Stress and Depression	2.58(0.21)
Food craving	2.55(0.29)
Social Barriers	2.32(0.22)
Adverse Effects of Weight-Loss Diet	2.14(0.59)
Cost of diet	2.13(0.51)
<b>Barriers factors to physical activity</b>	
External Barriers	2.29(0.23)
Internal Barrier	2(0.52)

\* The mean factor scores were calculated for each factor by averaging the Likert scores of individual items that composed each factor

**Table 4:** Multiple linear regression analysis of variables associated with barriers to weight-loss diet adherence in overweight and obese women (n=204)\*

Barriers factors to weight-loss diet adherence	$\beta$	p-value	95 % CI†		R <sup>2</sup>	Adjusted R <sup>2</sup> §
			Lower bound	Upper bound		
<b>Factor 1: Situational Barriers</b>					0.081	0.071
(constant)	0.679	0.139	-0.222	1.580		
University degrees	0.329	0.048	0.004	0.655		
BMI	-0.29	0.041	-0.057	-0.001		
<b>Factor 2: Stress and Depression</b>					0.041	0.036
(Constant)	-0.103	0.220	-0.267	0.062		
Employee	0.489	0.006	0.145	0.833		
<b>Factor 3: Social Pressure</b>					0.090	0.075
(Constant)	1.455	0.001	0.571	2.338		
University degrees	-0.300	0.064	-0.618	0.018		
Employee	0.339	0.045	0.007	0.670		
BMI	-0.050	0.000	-0.076	-0.023		
<b>Factor 5: Food craving</b>					0.064	0.043
(Constant)	0.325	0.494	-0.610	1.259		
High school graduate	0.303	0.064	-0.018	0.625		
Student	0.424	0.066	-0.028	0.877		
Marital status	0.402	0.059	-0.016	0.820		
BMI	-0.028	0.048	-0.055	0.000		
<b>Factor 6: Cost of diet</b>					0.040	0.029
(Constant)	0.428	0.010	0.104	0.753		
High school graduate	-0.462	0.030	-0.878	-0.045		
University degrees	-0.521	0.008	-0.906	-0.136		

\*The mean standardized of each factor scores selected as dependent variables while demographic variables and BMI selected as independent variables in Multiple linear regression model with backward method./ † Confidence Interval /§ Adjusted for age, BMI, marital status, job status and educational levels

Independent variables accounted for a moderate amount of the variance in the two

factors of perceived barriers to physical activity (Table 5). Employment and being student were highly associated with external barriers.

These variables were mostly associated with item "not having enough time to be physically active because of job or education" ( $\beta=2.126$ ,  $P<0.001$  and  $\beta=1.783$ ,  $P<0.001$  respectively).

Women with higher BMI reported less external barriers. Older women who had low educational level, perceived more internal barriers.

**Table 5:** Multiple linear regression analysis of variables associated with barriers to physical activity in overweight and obese women (n=204)\*

Barriers factors to physical activity	$\beta$	p-value	95 % CI		R <sup>2</sup>	Adjusted R <sup>2</sup> §
			Lower bound	Upper bound		
<b>Factor 1: External Barriers</b>					<b>0.278</b>	<b>0.266</b>
(constant)	0.585	0.168	-0.249	1.419		
Employee	1.018	0.000	0.684	1.352		
Student	0.541	0.002	0.206	0.875		
BMI	-0.035	0.006	-0.060	-0.010		
<b>Factor 2: Internal Barriers</b>					<b>0.251</b>	<b>0.238</b>
(Constant)	-0.182	0.537	-0.761	0.398		
High school graduate	-0.434	0.020	-0.800	-0.068		
University degrees	-0.857	0.000	-1.220	-0.494		
Age	0.022	0.001	0.010	0.035		

\*The mean standardized of each factor scores selected as dependent variables while demographic variables and BMI selected as independent variables in Multiple linear regression model with backward method/ § Adjusted for age, BMI, marital status, job status and educational levels

## Discussion

In order to improve weight-loss diet adherence and increase population physical activity levels, it is important for those involved in obesity prevention and treatment to aware of the difficulties that people at high risk of weight gain perceive in trying to lose weight. The present study, which is the first report of perceived barriers to weight-loss programs in Iran, revealed six barriers to weight-loss diet adherence and two barriers for being physically active.

"Situational barriers" was the most important factor kept study subjects from sticking with recommended diet. These findings were consistent with the results of previous studies<sup>19, 20</sup> which showed that situational barriers could affect dietary adherence among different groups of population. They reported that it was difficult to adhere to the diet when the daily routine was disrupted such as at weekend, when being in a party, traveling and

eating out. More over in these situations, external cues probably encourage people to eat more. In study performed in Finland by Lapalainen et al., eating out especially with friends or coworkers was one of the barriers to recommended diet in patients with cardiovascular disease<sup>21</sup>.

Foods especially high calorie ones are served and available in parties and ceremonies of Middle-east countries. The results of Maleka et al. study showed that parties were the important factor that alter adherence to cardiovascular dietetic recommendation in Kuwait<sup>19</sup>. Women with university education reported situational barriers more than women with secondary or primary education. Probably, high-educated women had extended social contacts and experience more events that disrupt daily routine than low educated ones.

"Stress and depression" was the next important barrier. In this study, obese women indicated that stress and depression made them to eat too much and not to adhere to the

diet. In Sanlier and Unusan study<sup>22</sup>, the obese Turkish women had a higher average score compared to normal weight women within the stress factors scale. The results of the study carried out by Dragan and Akhtar-Danesh<sup>23</sup>, indicated that higher BMI was associated with more severe form of depression. In the present study, employed women reported stress and depression as important barriers to diet adherence more than housewives and students. Obviously, employed women experience more stress than others do because they not only have stress at work but also have responsibilities of house working and childcare. Consequently, these stressful circumstances keep them from completely compliance with weight-loss diet. There are some mechanisms suggested by previous studies about the relationship between stress and over eating. One of them is the association between stress and feeding via opioid system in the body<sup>24</sup>. Eating is both pleasurable and rewarding<sup>24</sup>. Researchers have shown that eating activates neural substrate such as dopamine, opioid, benzodiazepine and GABA neurotransmitters that lead to improve mood and alleviate stress<sup>25</sup>. In stressful events, endogenous opioid neuropeptides, involved in rewarding processes in eating behaviors, stimulate appetite by palatable foods. Consequently, consuming high-energy foods alleviates behavioral symptoms of stress<sup>26</sup>.

The other mechanism seems to consistent with the results of present study is that dieters or restrained eaters maybe unresponsive to their internal physiological influences on appetite, therefore cognitively demanding situations, which may be stressful, lead to disruption of restraint and so overeating, especially of sweet fatty foods<sup>27</sup>. For example in students, the time of exams or long working hours associated with high intake of energy and low intake of healthy foods<sup>28</sup>.

The other important barriers was "food craving" especially sweet tooth which is common among women<sup>29</sup>. Positive associations have been shown between food cravings and

excessive overeating<sup>30</sup>, BMI<sup>31</sup>, binge eating and bulimia<sup>32</sup> and low compliance with weight reduction programs<sup>31</sup>. Much of the literature of food craving has been devoted to carbohydrate cravings<sup>30</sup>. These craving has been evidenced mostly in women<sup>30</sup>. In premenstrual syndrome, the level of serotonin reduced in brain leading to changes in mood and sensitizing to stress and depression<sup>32</sup>. Subsequently, cravings to the food that increase the ratio of triptophan relative to other amino acid are increased<sup>33</sup>. Probably, the subjects of present study tended to consume foods that were prevented from, because of dietary restraint. Understanding the mechanisms underlying food cravings and aversions may lead to improved methods for the prevention and treatment of obesity and eating disorders.

"Social pressure" moderately affected weight-loss diet adherence in overweight or obese women in our research. Women indicated that family meal routines and feeding children were challenges in the way of following weight-loss diet. Additionally, they would not have enough support of their husbands, parents and friends to keep on adhering to the recommended diet. Some of them, who especially spent much time with their friends, claimed that friends made them to eat high calorie foods. Satia et al. showed that social pressure to change diet was significantly associated with higher fat intake<sup>34</sup>. Kearney et al. found that non-adherent women reported more difficulty resisting negative emotions and prior food preferences and habits<sup>35</sup>; they were also more concerned about negative responses from others. In this study, employed women perceived this barrier more than other groups. Probably, women who work, have little time to prepare different meals for themselves and the other member of their family. Moreover, they may be under the pressure of coworkers for eating at work.

The least important barriers were "adverse effects of weight-loss diet" and "cost of diet". The weight-loss diets delivered in nutritional counseling centers in this study were

scientific diets that were prescribed by nutritionists. This may be the reason of low rating the adverse effects of diet as a major barrier.

There may be several reasons for low rating of cost: the diet might not be expensive in whole or the participant might have had so large desire or need to lose weight that they had not paid attention to the cost of diet. Because of face-to-face interview, underreporting would be another reason for low rating of cost. Considering educational level as an indicator of socioeconomic status (SES), women with low education (low SES) reported cost of diet as a barrier, significantly more than high-educated ones.

One of the interesting results was the negative correlation between BMI and three important barriers: situational barriers, food craving and social pressure. Obese women had reported fewer barriers on these factors than overweight ones. It is possible that obese subjects actually have more barriers but because of underreporting, they pay less attention to the barriers. The report of Lappalainen et al. also indicated the underreporting of barriers by obese patients receiving nutrition counseling as part of cardiac rehabilitation<sup>27</sup>.

Our findings in relation to physical activity were similar to the result of Allison et al. and Dunton et al. studies who reported external and internal barriers to physical activity<sup>36,37</sup>. However, unlike the results of these studies, “external barriers” were more important than “internal barriers” in present research. One explanation for this inconsistency is that these studies were carried out in developed countries in which physical activity resources and facilities are sufficient and persons have an easier access to them. Therefore, barriers to physical activity in developed countries usually related to motivational and internal barriers while in developing ones such as Iran, there are lack of facilities, places and educational program for exercise and physical activity especially for women. Consequently, the barriers, which were reported by subjects more frequently, were “external barriers”. Lack of

time due to work and study commitments was the most important item loaded on “external barriers”. Lack of time as barriers to physical activity was reported to be the most important barriers in many of the previous studies<sup>7,10,36-38</sup>. Employed women and women who were students tended to report time as a major barrier to physical activity more than others did. Furthermore, they complained about feeling tired, which prevent them to do exercises.

Lack of interest and motivation to do exercises was the most important items of “internal barriers”. This was consistent with the results of Allison et al. study<sup>36</sup>. Tiredness of doing exercise because of overweight was one of the internal barriers reported by the obese participants of the present study. By the study of 16314 Australian adult with overweight or obesity, Atlantis et al.<sup>39</sup> found that higher weight was one of the barriers to physical activity performance. Inability to perform physical activity because of joint pain and osteoarthritis was one of the internal barriers reported by older women in present study. Osteoarthritis is major reason for physical inability in older women<sup>40</sup>. Evidences show that obesity has strong association with knee osteoarthritis and weight reduction would be a preventive strategy<sup>41</sup>. Therefore, osteoarthritis and joint pain should be paid attention in designing exercises for middle aged and old ones<sup>42</sup>.

In developing countries, weight-loss strategies focus more on diet and exercises while in present study we showed that the majority of perceived barriers were related to life style and behavior. Therefore, nutrition and health authorities, must pay attention to behavioral treatment and apply behavior change models<sup>43</sup>. Typical behavioral therapies include cognitive behavioral therapy strategies in the treatment of obesity<sup>43</sup>. There is a need to revise weight reduction and physical activity promotion messages and better inform people how they can feasibly adopt the strategies.

Our study-sampling frame was limited to patients attending the nutritional counseling

center, which generally reside in the North West region of the country. Therefore, the findings are not expandable to the wider community. Under reporting of barriers by respondents due to considerations they may had when expressing their daily living circumstances in a face to face interview can be regarded as another potential limitation for this study.

## Conclusion

Findings from this study have tentative implications for diet and nutrition policies and programs. Weight reducing strategies should take into account the specific perceived barriers to weight-loss diets faced by overweight or obese women, particularly situational barriers, stress and depression and food craving; and lack of time and lack of motivation as barriers to physical activity.

## Acknowledgements

This article was written based on a dataset of M.Sc. thesis registered in Tabriz University of Medical Sciences. The authors wish to thank the Nutritional Research Center in Tabriz University of Medical Sciences for the financial support. This study would not have been possible without the help and participation of the patients attending the nutrition-counseling center in Sheikh Al-Raiss Specialized and Professional Clinic.

## Competing interests

The authors declare that there is no conflict of interests.

## References

1. Prentice AM. The emerging epidemic of obesity in developing countries. *Int J Epidemiol* 2006; 35:93–99.
2. Janghorbani M, Amini M, Willett WC, Gouya MM, Delavari A, Alikhani S, et al. First nationwide survey of prevalence of overweight, underweight, and abdominal obesity in Iranian adults. *Obesity* 2007; 15:2797-2808.
3. Naghavi M. Health and disease survey in year 2000. Iran: Deputy for Health, Ministry of Health and Medical Education I.R.; 2000:56. [In Persian]
4. Daddario DK. A review of the use of the health belief model for weight management. *Med surg Nurs* 2007;16:363-366.
5. WHO Consultation. Obesity: preventing and managing the global epidemic. World Health Organization technical report series. 2000(894).
6. Glanz K, Rimer BK, Viswanath K. Health behavior and health education: theory, research, and practice. San Francisco: Jossey-Bass; 2008.
7. Andajani-Sutjahjo S, Ball K, Warren N, Inglis V, Crawford D. Perceived personal, social and environmental barriers to weight maintenance among young women: A community survey. *Int J Behav Nutr Phys Act* 2004;1:15.
8. Kearney JM, Mellhone S. Perceived barriers in trying to eat healthier: Results of a pan-EU consumer attitudinal survey. *Brit J Nutr* 1999; 81(suppl 2):S133-137.
9. López-Azpiazu I, Martínez-González MA, Kearney J, Gibney M, Martínez JA. Perceived barriers of, and benefits to, healthy eating reported by a Spanish national sample. *Public Health Nutr* 1999;2:209–215.
10. Sit C H P, Kerr J H, Wong I T F. Motives for and barriers to physical activity participation in middle-aged Chinese women. *Psychol Sport Exerc* 2008;9:266-283.
11. Booth ML, Bauman A, Owen N, Bore CJ. Physical activity preferences, preferred sources of assistance, and perceived barriers to increased physical activity among physically inactive Australians. *Prev Med* 1997;26:131-137.
12. Tucker P, Gilliland J. The effect of season and weather on physical activity: A systematic review. *Public Health* 2007;121:909-922.

13. Welsh EM, Jeffery RW, Levy RL, Langer SL, Flood AP, Jaeb MA, et al. Measuring perceived barriers to healthful eating in obese, treatment-seeking adults. *J Nutr Educ Behav* 2012;44:507-512.
14. Porter JS, Bean MK, Gerke CK, Stern M. Psychosocial factors and perspectives on weight gain and barriers to weight loss among adolescents enrolled in obesity treatment. *J Clin Psychol Med Settings* 2010;17:98-102.
15. Garaulet M, Perez-Llomas F, Zamora S, Tebar FJ. Weight loss and possible reasons for dropping out of a dietary/behavioral programme in the treatment of overweight patients. *J Human Nutr and Diet* 1999;12:219-227.
16. Ipchi M. The survey of weight loss trend in patients with overweight or obesity. *The 9th Iranian Congress of Nutrition* 2006; (Abstracts):p-186.(Persian)
17. Kaiser HF. An index of factorial simplicity. *Psychometrika* 1974;39:31-36.
18. Hutcheson G, Sofroniou N. The multivariate social scientist. London: Sage; 1999.
19. Maleka S, Hanadi A, Sawsan A, Abdel-Rahman M, Abdulla B. Cultural factors and patients' adherence to lifestyle measures. *Brit J Gen Pract* 2007;57:291-295.
20. John JH, Ziebland S. Reported barriers to eating more fruit and vegetables before and after participation in a randomized controlled trial: a qualitative study. *Health Educ Res* 2004; 19:165-174.
21. Lappalainen R, Koikkalainen M, Julkunen J, Saarinen T, Mykkanen H. Association of sociodemographic factors with barriers reported by patients receiving nutrition counseling as part of cardiac rehabilitation. *J Am Diet Assoc* 1998; 98:1026-1029.
22. Sanlier N, Unusan N. The relationship between body weight and stress and nutritional status in Turkish women. *Pakistan J Nutr* 2007;6:339-344.
23. Dragan A, Akhtar-Danesh N. Relation between body mass index and depression: a structural equation modeling approach. *BMC Med Res Methodol* 2007;7:17.
24. Gibson EL. Emotional influences on food choice: Sensory, physiological and psychological pathways. *Physiol Behav* 2006;89:53-61.
25. Berridge KC, Robinson TE. What is the role of dopamine in reward: hedonic impact, reward learning, or incentive salience? *Brain Res Rev* 1998;28:309-369.
26. Mercer ME, Holder MD. Food cravings, endogenous opioid peptides, and food intake: a review. *Appetite* 1997;29:325-352.
27. Haynes C, Lee MD, Yeomans MR. Interactive effects of stress, dietary restraint, and disinhibition on appetite. *Eat Behav* 2003;4:369-383.
28. Michaud C, Khan JP, Musse N, Burlet C, Nicolas JP, Mejean L. Relationships between a critical life event and eating behaviour in high-school students. *Stress Med* 1990;6:57-64.
29. Yanovski S. Sugar and fat: cravings and aversions. *J Nutr* 2003;133:835S-837S.
30. Burton P, Smit HJ, Lightowler HJ. The influence of restrained and external eating patterns on overeating. *Appetite* 2007;49:191-197.
31. Delahanty LM, Meigs JB, Hayden D, Williamson DA, Nathan DM. Psychological and behavioural correlates of baseline BMI in the diabetes prevention program (DPP). *Diabetes Care* 2002;25:1992-1998.
32. Parry BL. The role of central serotonergic dysfunction in the aetiology of premenstrual dysphoric disorder - therapeutic implications. *CNS Drugs* 2001;15:277-285.
33. Markus CR, Olivier B, Panhuysen GEM, Van der Gugten J, Alles MS, Tuiten A. The bovine protein alpha-lactalbumin increases the plasma ratio of tryptophan to the other large neutral amino acids, and in vulnerable subjects raises brain serotonin activity, reduces cortisol concentration, and improves mood under stress. *Am J Clin Nutr* 2000;71:1536-1544.
34. Satia JA, Kristal AR, Curry S, Trudeau E. Motivations for healthful dietary change. *Public Health Nutr* 2001;4:953-959.

35. Kearney M H., Rosal MC, Ockene J, Churchill L C. Influences on older women's adherence to a low-fat diet in the Women's Health Initiative. *Psychosom Med* 2002;64:450-457 .
36. Allison KR, Dwyer JJM, Makin S. Perceived barriers to physical activity among high school students. *Prev Med* 1999;28:608-615.
37. Dunton GF, Schneider M. Perceived barriers to walking for physical activity. *Prev Chronic Dis* 2006; 3(4):A116.
38. Kruger J, Blanck HM, Gillespi C. Dietary and physical activity behaviors among adults successful at weight loss maintenance. *Int J Behav Nutr Physic Act* 2006;3:17.
39. Atlantis E, Barnes EH, Ball K. Weight status and perception barriers to healthy physical activity and diet behavior. *Int J Obes* 2008;32:343-352.
40. Centers for Disease Control and Prevention (CDC). Prevalence of self reported arthritis or chronic joint symptoms among adults: United states, 2001. *MMRW Morb Mortal Wkly Rep* 2002; 51:948-950.
41. Messier SP, Loeser RF, Miller GD, Morgan TM, Rejeski MW, Sevick MA, et al. Exercise and dietary weight loss in overweight and obese older adults with knee osteoarthritis. *Arthritis Rheum* 2004;50:1501-1510.
42. Van baar ME, Assendelft WJ, Dekker J, Oostendorp RA, Bijlsema JW. Effectiveness of exercise therapy in patients with osteoarthritis of the hip or knee: a systematic review of randomized clinical trials. *Arthritis Rheum* 1999; 42:1361-1369.
43. Vranešić Bender D, Krznarić Z. Nutritional and behavioral modification therapies of obesity: facts and fiction. *Dig Dis* 2012;30:163-167.