

Original Article

Effect of Psychological Distress on Weight Concern and Weight Control Behaviors

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Abstract

Background: Obesity is associated with chronic disorders like coronary artery diseases, metabolic syndrome, cancers, and psychiatric disorders. Stress may contribute to weight gain by disrupting weight concern, and lead to uncontrolled eating behavior. This study aimed to investigate the effects of stress on weight concern and control behaviors in normal weight and obese adults.

Methods: A total of 9544 subjects were selected by multi-stage random sampling from three provinces in central Iran. Information related to weight concern and control behavior was registered in normal weight and obese participants. Psychological distress was measured by a 12-item General Health Questionnaire (GHQ-12) and subjects were divided into high and low stress groups. Logistic regression was used for analysis.

Results: The mean age of participants was 38.7 ± 15.5 years and 50% (4772) of them were males. The adjusted odds ratio (OR) for age, sex and education of high stress to low stress level for weight concern, weight control behavior and acceptable physical activity behavior was more than 1; but the OR was less than 1 for waist circumference, obesity and healthy diet behavior. Among obese participants, higher levels of stress were associated with lower weight concern with OR, 95%CI: 0.821, (0.682 – 0.988), lower acceptable physical activity with OR = 0.833, 95%CI: (0.624 – 0.912), but higher rates of healthy diet behavior with OR = 1.360, 95% CI: (1.040 – 1.780).

Conclusion: Individuals with high stress level have lower weight concern and lower physical activity; therefore, they are prone to weight gain and obesity. It could be concluded that stress management should be considered as a crucial component of obesity prevention and control programs.

Keywords: Iran, obesity, psychological distress, weight concern, weight control behavior

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Introduction

Obesity is a rising problem in modern societies; it leads to an increase in the prevalence of chronic disorders such as type 2 diabetes mellitus, cardiovascular diseases, metabolic syndrome, some types of cancers, and psychiatric disorders.¹ Chronic stress has attracted attention as a promoting factor for the development of obesity. Epidemiological studies have reported an association between stress, obesity and its consequences. Stress

can influence human eating behaviors by increasing the appetite for highly palatable and high energy foods. Moreover, when exposed to a stressor, people prefer to eat or overeat some foods that they were avoiding before.² It seems that eating in the absence of hunger is affected by stress among adults.³ In support of this notion, high depression and anxiety levels have been reported among both overweight males and females.⁴ On the other hand, one study did not find any significant difference in food intake between high stress and low stress females.⁵ Moreover, female gender and older age have been found as effective factors for stress level.⁶ Also, it has been suggested that obesity is an important predictor of psychological distress.⁷

Physical activity and exercise are known as weight control behaviors. A review suggested that physical activity and exercise could contribute to favorable adaptation with stress and attenuate its negative effects.⁸ It has been reported that stress significantly impairs physical activity,⁹ and encourages overeating and oversleeping.¹⁰

Some studies have already reported the prevalence of obesity and its association with stress in Iran,^{11,12} but none were designed to investigate the factors affecting stress level or the effects of stress on weight concern and weight control behaviors. In order to fill this gap, we performed this study with main goals of determining the effective factors on stress level, and association between stress levels and weight concern and control behaviors in normal and obese individuals of a representative sample of the central parts of Iran.

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Materials and Methods

Data were obtained from part of the “Isfahan Healthy Heart Program” (IHHP), which is a community-based program designed to prevent and control cardiovascular disease and promote healthy lifestyle behaviors. The IHHP aims and design are described in detail elsewhere.^{13,14} The protocol of the study was approved by the ethics committee of the Isfahan University of Medical Sciences.

Study population

A total of 9553 men and women aged ≥ 19 years from three cities in central parts of Iran (Isfahan, Najafabad and Arak) were selected according to the latest national census in 2007. In each urban or rural community, a sample of adults was selected through multi-stage random sampling. Clusters were defined according to the local health services divisions. Then, they were stratified based on their age and sex. To achieve adequate sample size, those who declined to participate in the study were replaced by their neighbors. Pregnant, mentally retarded or physically disabled individuals were not eligible for enrolment. According to the 2006 National Census, the population of Isfahan and Najafabad (a cities neighboring Isfahan) was 1,986,542 and 282,430, respectively. Arak, with a population of 615,702 is located in northwest of Isfahan.^{14,15}

Demographic and anthropometric measurements

After obtaining written informed consent, data on demographic, anthropometric and socioeconomic characteristics and lifestyle behaviors were collected by standardized interviewer-administered questionnaires.

We categorized the participants' educational level as 0 – 5 years (primary school), 6 – 12 years (high school) and > 12 years (university degree).

Psychological distress

Psychological distress was measured by a 12-item General Health Questionnaire (GHQ-12), a self-administered screening tool for assessing psychological distress.¹⁶ GHQ-12 is a consistent and reliable instrument for use in general population studies.¹⁷ Each item is rated on a four-point scale (less than usual, no more than usual, fairly more than usual and much more than usual). The system used to score the GHQ-12 questionnaires was the 0-0-1-1 method. Using this method, a participant could have been scored between 0 and 12 points; a score of 4 or more was used to identify a participant with high stress level.

Term definitions

In our study, weight concern was defined as the individual's perceived weight and body dissatisfaction and was determined by the following dichotomous question: “Are you satisfied with your current body shape and size?” Everyone who gave negative response to the first question was considered weight-concerned and was asked the following: “Are you doing any type of activities to reduce your weight?” The participants' positive responses to the latter question were reported under the title of “weight control behavior”. Individuals with weight concern underwent a complete enquiry about the type and quality of their weight-reducing activities. Healthy behavior was defined as acceptable physical activity and healthy diet (low fat and low calorie foods) which were in compliance with the advice of professionals.^{13,14} In this study, obesity was defined based on a waist circumference ≥ 88 cm in

females and ≥ 102 cm in males.¹⁸

Statistical analysis

The Statistical Package for Social Sciences version 15.0 (SPSS Inc., Chicago, IL, USA) was used for all statistical analyses. Quantitative variables were expressed as mean \pm standard deviation. To compare continuous variables between groups, Student's t-test was used. Categorical variables were compared between groups using Chi-square and Wilcoxon tests. The enter method of logistic regression analysis was used for determining the effect of obesity, weight concern, weight control behavior, healthy diet behavior, and acceptable physical activity behavior as independent variables on the stress level of all subjects and obese individuals separately. Age, gender and education level were considered for adjustment. A *P*-value of less than 0.05 was considered statistically significant in all analyses.

Results

A total of 9544 individuals (mean age: 38.7 ± 15.5 years; 50% male) were enrolled in the study. The participants' characteristics are shown in Table 1. Subjects with higher stress levels were significantly older and more likely to be female or obese. They had healthier diet behavior but had lower education level, less concern about their weight, weight control behavior and acceptable physical activity (Table 1).

The results of analyses in the obese subset are summarized in Table 2. According to the table, subjects with higher levels of stress were older, more likely to be female and had greater waist circumference and healthy diet behavior while their education level, weight concern, and acceptable physical activity was significantly lower (Table 2).

In obese participants, crude and adjusted ORs of high stress to low stress level was higher than 1 for weight concern and acceptable physical activity behavior, but lower than 1 for waist circumference and healthy diet behavior. Weight control behavior was not different between the two groups on multivariate analysis (Table 3). Even after adjustment for education, in addition to age and sex, statistical significant level, the ORs and their 95% CIs did not change significantly.

Discussion

We found that high stress people were more obese. In line with this finding, some other studies have shown the association of higher levels of stress with obesity.¹⁹ Other factors may influence stress effects in weight gain and obesity but in our study, as well as another one,²⁰ high level of psychological distress remained significantly associated with obesity after adjusting for possible confounders; however, it seems that there is a reciprocal association between obesity and stress level, and at least one study has found obesity to be a predisposing factor to experiencing high levels of psychological distress.⁷ In contrast, one study has reported lower levels of stress among young obese Bangladeshi people compared to normal-weight subjects.²¹ This controversy might indicate that cultural differences may play a role in the correlation between psychological distress and obesity.

We found that people with high levels of stress have lower concern about their weight gain, less weight control behavior, and less acceptable physical activity which are important factors in

Table 1. Basic characteristics of participants in study of psychological distress effect on weight concern and control behaviors^a

	Low stress (n = 6289)	High stress (n = 3264)	P
Age (years)	38.4 ± 15.1	39.5 ± 16.2	0.001
Sex			< 0.001
Male	3402 (54.1%)	1375 (42.1%)	
Female	2887 (45.9%)	1880 (57.9%)	
Education level			< 0.001
5 year(s)–0	2677 (42.6%)	1619 (49.7%)	
12 years–6	2699 (43.0%)	1278 (39.2%)	
> 12 years	901 (14.4%)	363 (11.1%)	
Obesity ^b	1795 (28.6%)	1020 (31.2%)	< 0.001
Weight concern	4580/6289 (72.8%)	2137/3264 (65.5%)	< 0.001
Weight control behavior	1956/4580 (42.7%)	880/2137 (41.2%)	0.048
Healthy diet behavior	666/1956 (34.0%)	398/880 (45.2%)	< 0.001
Acceptable physical activity behavior	973/1956 (49.7%)	397/880 (45.1%)	< 0.001

^aData are expressed as mean ± SD for continuous variables and number (percentage) of participants for categorical variables; ^bobesity as: waist circumference ≥ 88 cm for females and ≥ 102 cm for males

Table 2. Characteristics of obese individuals in study of psychological distress effect on weight concern and control behaviors^a

	low stress (n = 1795)	high stress (n = 1020)	P
Age (years)	43.7 ± 14.9	45.8 ± 15.3	< 0.001
Sex			< 0.001
Female	1425 (79.4%)	871 (85.4%)	
Male	370 (20.6%)	149 (14.6%)	
Education level			< 0.001
5 years–0	1077 (60.2%)	689 (67.6%)	
12 years–6	589 (32.9%)	276 (27.1%)	
> 12 years	123 (6.9%)	54 (5.3%)	
Waist circumference (cm)	101.3 ± 8.4	102.2 ± 9.1	< 0.001
Weight concern	1276/1795 (71.1%)	640/1020 (62.7%)	< 0.001
Weight control behavior	616/1276 (48.3%)	320/640 (50.0%)	0.786
Healthy diet behavior	243/616 (40.1%)	171/320 (51.8%)	0.003
Acceptable physical activity behavior	220/616 (36.3%)	102/320 (30.9%)	0.049

^aData are expressed as mean ± SD for continuous variables and number (percentage) of participants for categorical variables

Table 3. The association of weight related factors with high level stress in obese individuals

	Unadjusted	Adjusted ^a
Waist circumference (cm)	1.015 (1.004, 1.580)	1.045 (1.025, 1.956)
Weight concern	0.718 (0.604, 0.854)	0.821 (0.682, 0.988)
Weight control behavior	0.977 (0.827, 1.154)	1.227 (0.996, 2.042)
Healthy diet behavior	1.492 (1.147, 1.940)	1.360 (1.040, 1.780)
Acceptable physical activity behavior	0.757 (0.571, 0.904)	0.833 (0.624, 0.912)

^a Adjusted for age, sex and education

controlling weight. Behavioral weight control intervention with stress management components increases concern about weight and weight control behaviors in overweight/obese women.²² One study found that 80% of adolescent girls with high level disturbance such as psychosocial problems had no real concern about their weight.²³ On the other hand, a study reported that difference in weight concern can account for difference in psychological stress experience.²⁴ In addition, job strain was positively associated with average daily intake of fat in a Japanese population.²⁵ Prolonged stress was associated with lower leisure time physical activity in both men and women.^{26,27} Subjects with significantly lower levels of stress had two to three times more physical activ-

ity.²⁸ However, even among the limited number of available studies, some degree of inconsistency can be seen, as another study did not find any role for health behaviors such as physical activity in the association of stress and weight gain.²⁹

It has been shown that high levels of chronic stress make short-term endocrine changes such as Hypothalamic–pituitary–adrenal (HPA) axis regulation disruption and increased levels of glucocorticoids,³⁰ which may lead to prolonged physiologic consequences even after termination of the stressor. Positive association of obesity and plasma cortisol level is now well-documented.³¹ Cortisol level is positively associated with response of right amygdala in brain. Acute stress can potentiate right amygdala response to food

and stress-related eating which leads to changes favoring high caloric and high-fat diets.³² Excess eating has been reported among stressed subjects and a study has suggested the inhibition of satiety by stress.³³ The association of uncontrolled eating under stress with obesity has been reported by Heatherton, et al. only in females;³⁴ but stressed men ate significantly lower unhealthy foods than non-stressed subjects in another study.³⁵ It is noteworthy that these findings were challenged by some contradictory studies. One study failed to find any significant difference in food intake between high stress and low stress females.⁵ In addition, Shapiro, et al.³⁶ rejected more calorie intake and hunger level among people with higher levels of stress. Although our results show that subjects with higher stress have healthy diet behavior, it has been reported that individuals consuming healthy foods, such as fish, experience half the psychological distress experienced by subjects using high calorie foods.³⁷

According to our findings, stress level was higher in women. Girls had higher mean of stress score in their life compared to boys.²⁸ It seems that females experience higher levels of stress and they show more negative psychological symptoms than males.¹² Previous observations have shown that women are more prone to overeating in high stress situations.³⁸ Therefore, females need more attention when stressed and lack of emotional support is the most important factor predicting stress-related eating in this group.³⁹ These results indicate a gender specific response to stress. We found that higher level of stress is associated with lower level of education.

Overweight and obese people are at higher risk of having lower levels of education and higher rates of unemployment.⁴⁰ Level of stress-related cortisol was positively associated with lower education level in a report by Rosmond, et al.⁴¹ We found that education has an important role in weight concern, because patients with high level of stress were obese and also less educated. Women with lower level of education might have more traditional habits and views that link beauty and health with being slightly overweight.³⁹ However, another study could not find any significant association between education and stress level.⁴²

We found a direct positive correlation between stress level and age. Disturbance of HPA axis is more common among elderly males and females than younger population.⁴³ Therefore, this abnormality causes a mal-adaptation of old people with stress which may make them obese.⁴⁴ Furthermore, baseline cortisol concentration increases with age in women.⁴⁵ In contrast, it is suggested that psychological distress decreases with age, especially in women.⁴⁶

Although the present study benefited from a large and representative sample, the following limitations should be considered when generalizing the results. First, the people of central parts of Iran were our target population whose habits and culture may differ from other parts of Iran. Therefore, this study may not be applicable to all Iranians. Second is the probability of recall bias which may influence the subjects' answers about weight concern, food intake, and physical activity. However, the impact of this bias was estimated negligible. Finally, the design of this study was cross-sectional; hence, associations should be interpreted cautiously.

Our findings showed that people with high levels of stress had less weight concern and physical activity compared with low-stress subjects. It seems that high level of stress distracts people's attention from their body shape and prevents them from doing acceptable physical activity. Accordingly, stress management strategies may contribute to weight control or preventing overweight obesity.

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Conflict of Interest

There is no conflict of interest.

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