

Predicting body mass index in women: The value of the psychological components of depression, anxiety, dietary restraint, and nutritional habits

Behnaz Nikkar Esfahani, Majid Kolehdozan, Abdulaziz Aflakseir, Mojgan Gharipour¹

Department of Clinical Psychology, Shiraz University, Shiraz, ¹Isfahan Cardiovascular Research Center, Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran

ABSTRACT

Background: Understanding the association between psychological affective disturbances and anthropometric parameters, including body mass index (BMI), is important. These issues may have potential preventive effects on weight reduction in relation to different aspects of women's lifestyles and psychopathological states. The present study aimed to predict BMI based on psychological factors including; depression, anxiety, dietary restraint, and nutritional habits, in a sample of women with sedentary jobs in several Iranian governmental organizations. **Methods:** Two hundred consecutive women aged over 25 years, working on sedentary or low standing works such as banker, teachers, and employee in the social security organizations in Isfahan, Iran, were entered the study. To assess the severity of depression and anxiety symptoms, the Beck Depression Inventory II and the State-Trait Anxiety Inventory were used, respectively. To assess nutritional habits, a self-administered questionnaire was designed, and to evaluate dietary restraint status, the Ruderman questionnaire was used. To find the co-relationship between BMI and each of the psychological components, Pearson's correlation coefficient test was applied. **Results:** To assess the relationship between BMI and each of the psychological components, a multivariate regression model was used. Only two components of nutritional habits ($b = -0.19, P < 0.001$) and dietary restraint ($b = 0.51, P < 0.001$) could effectively predict BMI in Iranian women; while depression and anxiety components had low predictive values for predicting BMI. In total, these four variables could predict 34% of the variance of the dependent indicator (BMI). **Conclusion:** Nutritional habits and dietary restraint have high value for predicting BMI status in women aged more than 25 years working in sedentary jobs, while BMI status could not be predicted by assessing depression or anxiety severity.

Key words: Anxiety, body mass index, depression, dietary restraint, nutritional habits

INTRODUCTION

Understanding the association between psychological affective disturbances and anthropometric parameters, including body

mass index (BMI), is important, because of the potential preventive effects of weight reduction on different aspects of women's lifestyles such as psychopathological states.^[1] In this regard, the relationship between obesity and psychological disorders has been widely assessed, and recent evidence-based findings have consistently emphasized associations between eating behavior and both depression and anxiety.^[1-3] The

Address for correspondence: Dr. Majid Kolehdozan, Salamat Iranian Clinic, Isfahan, Iran.
E-mail: mj.kolehdozan@yahoo.com

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This article may be cited as: Esfahani BN, Kolehdozan M, Aflakseir A, Gharipour M. Predicting body mass index in women: The value of the psychological components of depression, anxiety, dietary restraint, and nutritional habits. *J Edu Health Promot* 2017;6:9.

Access this article online	
Quick Response Code:	Website: www.jehp.net
	DOI: 10.4103/jehp.jehp_247_13

relationship between weight and depression, suicidal ideation, or suicide attempts, has been investigated mainly in those classified as overweight or obese.^[4-9] Moreover, both ends of the weight spectrum have been shown to increase the risk of future depression outcomes and suicide.^[10,11] These researches may be more important in women due to physiological and endocrinological fluctuations in different periods of their life including; menstrual, pregnancy, and postmenopausal periods. In addition, the relationship between dietary restraint and BMI has been found in several longitudinal studies on adolescents, especially in women.^[12-14] In general, research has shown that women with higher socioeconomic status are more concerned about their weight and fitness indicating a probable association between restrained eating and anthropometric indices.^[15]

Several studies have done to find an association of adult weight gain and obesity with subscales of eating behavior characteristics in women. Some of them found high levels of habitual disinhibiting were associated with substantial weight gain and obesity in older women European countries.^[13-15] But regarding to the difference in cultural and nutritional habits in different population and as to the best of our knowledge, no previous study have done among Iranian woman to find relation of weight gain psychological factors among Iranian employer women.

The present study aimed to predict BMI based on psychological factors including; depression, anxiety, dietary restraint, and nutritional habits and behaviors. In this regard, we considered women with sedentary jobs, in order to control for the confounding effects of dynamic active conditions. In this context, a reduction of BMI may effectively prevent the progression of psychological defects and vice versa.

METHODS

In a cross-sectional study, 200 women aged more than 25 years, working on sedentary and less standing jobs in Isfahan, Iran, including banks, social security organizations, were entered in the study. Subjects with BMI higher than 30 kg/m² were not included. To assess the severity of depression symptoms, the Beck Depression Inventory (BDI-II) was used.^[15] Each answer was scored on a scale of 0–3 with the cut off points of 0–13: Minimal depression; 14–19: Mild depression; 20–28: Moderate depression; and 29–63: Severe depression. Higher total scores indicated more severe depressive symptoms. According to previous population-based studies on the BDI-II-Persian version, this tool has a high internal consistency (Cronbach's = 0.87), and acceptable test-retest reliability ($r = 0.74$).^[16] Anxiety levels were assessed with the State-Trait Anxiety Inventory (STAI) developed by Charles Spielberger. This psychological inventory is based on a 4-point Likert scale and consists of 40 questions on a self-report basis.^[17] The STAI measures two types of anxiety including; state anxiety or anxiety about an event, and trait anxiety, or anxiety levels as a personal characteristic. Higher scores are positively correlated with higher levels of anxiety.

Each type of anxiety has its own scale of 20 different questions. Scores range from 20 to 80, higher scores correlating with higher anxiety level.^[18] The reliability and validity of the Farsi adaptation of Spielberger's State-Trait Inventory were shown indicated to be high (Cronbach's coefficient of 0.93 and content validity of 83.0%).^[19] To assess nutritional habits, a self-administered questionnaire was designed which included biological, behavioral, and cultural factors, as well as some nutritional-related items such as; place of eating, eating time, speed of eating, and overeating. This questionnaire contained 25 items that scored 0–20. Score equal to 15 or higher indicated proper nutritional habits, while lower scores showed the existence of poor nutritional habits that were not conducive for maintaining proper body weight and fitness. To assess dietary restraint status, the Ruderman questionnaire was used; it contained 10 items related to attitudes about; eating, frequency of dieting, and weight fluctuations.^[20] The restraint scale included questions that assessed weight fluctuation and personal concerns about diet. The scores of this tool varied from 0 (without response) to 4 or 5 (with the highest response).^[21] The reliability of this questionnaire in our study population was evaluated, and a Cronbach's coefficient of 0.68 was achieved.

After obtaining permission from the relevant governmental organizations, the questionnaires were presented to the women in their workplaces. The subjects were then weighed and measured. A mechanical column scales (Seca weighing scale; 700, Germany) measured their body weight with an accuracy of ± 100 g and their height to the nearest 0.5 cm. BMI was calculated as weight in kilograms divided by the square of the height in meters (kg/m²).

The results were presented as mean \pm standard deviation for the quantitative variables, and they were summarized by absolute frequencies and percentages for the categorical variables. The Pearson's correlation coefficient test was applied to assess the correlation between the quantitative variables. Multivariable linear regression analysis was used for predicting BMI on different psychological components. For the statistical analysis, a statistical software SPSS (version 19.0) for Windows (SPSS Inc., Chicago, IL, USA) was used. $P < 0.05$ were considered statistically significant.

RESULTS

With respect to the baseline information; 36.5% of the individuals were aged 25–35 years, 43.5% were aged 36–45 years, 18.0% were aged 46–55 years, and 2% were aged more than 55 years. With regard to their marital status, 87.5% were married. The overall BMI mean in the studied women was 25.07 ± 4.54 kg/m² (range: 14–49 kg/m²). In terms of their psychological states; the mean score of depression severity was 10.9 ± 7.4 (range: 0–37), the average score of trait anxiety was 44.77 ± 9.99 (range: 22–72), and the average score of state anxiety was 42.35 ± 8.97 (range: 12–67). The mean score of -3.08 ± 10.16 (range: -31–21) was obtained for nutritional habits and a mean score of

11.02 ± 4.49 (range: 0–23) for dietary restraint. A Pearson’s correlation coefficient [Table 1] showed a reverse correlation of depression severity as well as anxiety levels with nutritional habit means, indicating that severe symptoms of depression and trait anxiety were both significantly correlated to poor nutritional habits (b = -0.18, b = -0.16, respectively). This analysis also found a reverse correlation between nutritional behavior and dietary restraint (b = -0.015). To assess the relationship between BMI and each of the psychological components using a multivariate regression model [Table 2], only two components of nutritional habits (b = -0.19, P < 0.001) and dietary restraint (b = 0.51, P < 0.001), could effectively predict BMI in women; while depression and anxiety items had low predictive values for predicting BMI. In total, these four variables could predict 34% of the variance of the dependent indicator (BMI).

DISCUSSION

The current study examined the value of a range of psychological components including; depression, anxiety, nutritional behavior, and dietary restraint, in order to predict BMI as a main indicator of obesity among a sample of Iranian women with sedentary jobs. Our results demonstrated the hypothesis that there is an association between nutritional habits and dietary restraint with BMI in women aged higher than 25 years having sedentary jobs and working in some governmental organizations with a low workload. Several studies have been conducted on girls and younger women in developed countries, which have revealed an association between restrained eating and higher BMI, however, those sub-groups generally contained women with healthier diets containing lower intakes of energy, carbohydrates, and proteins;^[22,23] while in our study population, the main focus was directed at women with higher ages and considerably lower physical activity in their workplace, so in this sense, our population was different from other studied population.

A previous systematic review has described employees with lower social positions as having higher stress levels and higher body weights, and these patterns were more apparent in women than in men.^[24] Several studies have reported a link between stress and BMI levels.^[25-27] However, in a meta-analysis of longitudinal studies on stress and adiposity, it was established that stress promotes weight gain.^[28] Work stress has also been associated with an increased BMI. In a follow-up study of a group of male and female employees, their findings showed increased alcohol consumption and decreased vegetable

consumption in workers with low job control.^[29] On the other hand, in a group of low-income young mothers, perceived stress was not a significant predictor of obesity.^[23]

Longitudinal studies can provide insights into the direction and potential nature of associations among these variables. It is plausible that the obesity is a consequence of stress, for example reflecting the use of maladaptive coping strategies such as comfort eating or excessive sedentary behaviors.^[25] Previous studies have reported that chronic stress is associated with binge or comfort type eating,^[26] reduced physical activity levels,^[27] and increased sedentary behaviors.^[28] Preferences for more palatable, higher fat, energy dense foods have also been associated with stress.^[29,30]

Thus, it can be concluded that for women with sedentary jobs, who hold certain psychological attitudes, including; inappropriate dietary restraint and poor dietary behavior; this combination can result in a high BMI, and as a consequence related complications such as cardiovascular disorders are significantly elevated.^[31] This is of particular importance when we know that the Iranian women’s diet is currently undergoing negative changes, and fitness levels are falling. Thus, the association between weight and BMI along with the previously mentioned psychological components will provide valuable information. On the other hand, improving dietary patterns and mental health in this sub-group of women, along with dietary regime modifications that result in improvements of BMI, are essential in order to prevent predictable health hazards. In this regard, some authors believed that lifestyle modification programs for prevention and treatment of adult-onset obesity currently focus on reducing situational and emotional overeating; and hence a stronger emphasis on strategies that target habitual overeating can be warranted.^[14] This information could be valuable for identifying women in these types of conditions who might be at risk for obesity or its exacerbation due to underlying abnormal psychological attitudes.

Contrary to our expectations, the severity of anxiety and depression was not significantly correlated with BMI in this study. Previous longitudinal studies have reported that depression in women is correlated with the development and persistence of high BMI levels.^[32-37]

A recent review of eleven studies has suggested that depressive symptoms in women were associated with an approximately two- to three-fold increased risk of subsequent

Table 1: Correlations between different psychological components and BMI

Variables	BMI	Nutritional habits	Depression	Trait anxiety	State anxiety	Dietary restraint
BMI	1					
Nutritional habits	-0.28	1				
Depression	0.13	-0.18	1			
Trait anxiety	0.51	-0.16	0.61	1		
State anxiety	0.03	-0.09	0.61	0.77	1	
Dietary restraint	0.54	-0.15	0.10	0.08	0.06	1

BMI=Body mass index

Table 2: Multivariable linear regression analysis for predicting BMI on different psychological components

Item	Beta	T score	P	R	R ²
Nutritional habits	-0.19	-3.30	<0.001	0.59	0.34
Depression	0.10	1.29	0.19		
Trait anxiety	0.07	0.75	0.45		
State anxiety	-0.02	-0.23	0.81		
Dietary restraint	0.51	8.68	<0.001		

BMI=Body mass index

weight increase, when assessed after a period of 1–15 years.^[28] However, the results in these studies mainly focused on young women and consistent with our findings, little or poor association was found in the rates of obesity and mood disorders between the ages of 35 and 55 years.^[38] It seems that BMI can be potentially and widely affected by women's hormonal fluctuations.^[39,40] Furthermore, other confounders such as lifestyle and socioeconomic factors including; education level and family income, may play a crucial role in the interaction between obesity and psychological factors.^[41]

The study had some potential limitations. First, the study sample was composed of women employed in government organizations and completion of the questionnaire was done in their workplace. Due to the special conditions of the workplace including; time limits, job stress, responsibilities, and client referrals, it is possible that there was not enough attention paid to complete these questionnaires. In addition, the impact of nutritional habit, physical activity, and smoking was not considered in the study design.

CONCLUSION

Our study demonstrates the high value of nutritional habits and dietary restraint in predicting BMI status in women with sedentary jobs in governmental organizations in Iran. However, predicting BMI through the use of depression and anxiety status assessments was not demonstrated in our survey.

Acknowledgment

We acknowledge Shiraz University for grant no. 54589.

Financial support and sponsorship

Shiraz University, Shiraz Iran.

Conflicts of interest

There are no conflicts of interest.

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