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Original Article

Relationships between Eating Behaviors with Anthropometric Indices and Perceived Stress in Working Women

Maryam Moradi[1], Behnaz Abiri[2], Zahra Rampisheh[3], Parvin Sarbakhsh[4], Batool Tayefi[5], Mohammadreza Vafa[6*]

1- Eye Research Center, The Five Senses Health Institute, Rassoul Akram Hospital, Iran University of Medical Sciences, Tehran, Iran
2- Obesity Research Center, Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran
3- Department of Community Medicine, Iran University of Medical Sciences, Tehran, Iran
4- Department of Statistics and Epidemiology, School of Public Health, Tabriz University of Medical Sciences, Tabriz, Iran
5- Department of Community Medicine, Iran University of Medical Sciences, Tehran, Iran
6- School of Public Health, Iran University of Medical Sciences, Tehran, Iran

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ABSTRACT

Background and Objectives: In recent decades, significant increases in the prevalence of obesity in developing and developed countries suggest that obesity is a complex health problem. Environmental factors such as lack of physical activity, excessive TV watching and sedentary lifestyle, consumption of high-calorie foods and side effects of various drugs can cause overweight and obesity. Obesity is associated with severe health problems such as diabetes, hypertension, hyperlipidemia, asthma, arthritis and decreased life expectancy. Obesity includes profound effects on people's mental health. This study assessed relationships between anthropometric indices and perceived stress levels in working women.

Materials and Methods: After ethics committee approval from Iran University of Medical Sciences, Tehran, Iran, 395 healthy women between 20 and 50 years old participated in the study. Women who worked at Iran University of Medical Sciences completed questionnaires including general information and assessment of the participants' statuses of eating behaviors. Anthropometric variables, including height, weight, body fat percentage and waist and hip circumferences, were measured and body mass index and waist-to-hip ratio were calculated. Then, each participant completed questionnaires of perceived stress, 24-h food recall and physical activity.

Results: Anthropometric indices (weight, height, body mass index, waist circumference and hip circumference) were reported lower in people who ate breakfast than those who did not. Waist-to-hip ratio was lower in those with a slower eating speed than those of the fast group ($p = 0.034$). Weight, body mass index and body fat percentage were significantly higher in those eating during screen watch. No significant relationships were reported between the eating behaviors (speed rate, breakfast or not eating breakfast and eating with or without screen watch) and perceived stress levels. Anthropometric indices increased with increasing food intakes ($p < 0.001$) and decreasing physical activities, while no relationships were reported between dietary intakes and physical activities with perceived stress levels.

Conclusions: Dietary behaviors and physical activities affect anthropometric indices, while perceived stress levels do not affect dietary behaviors or anthropometric indices.

Keywords: Dietary behaviors, Anthropometric indices, Perceived stress levels, Physical activities

Introduction

In recent decades, significant increases in prevalence of obesity in developing and developed countries suggests that this issue is a complex health problem worldwide (1-3). Factors such as increased food intake, decreased physical activity, prolonged cell phone use, sedentary lifestyle and environmental and behavioral changes especially eating behaviors, may contribute to population weight gain and obesity (4, 5). One of the issues discussed is the frequency of meals and snack consumption during the day and its roles in overweight and obesity. Snacks can be as energetic as meals, leading to obesity; however, they can be used as diet modifiers by controlling energy intakes (6). Obesity is associated with severe health problems such as diabetes,

***Address for correspondence:** Mohammadreza Vafa, Professor of Nutritional Sciences, School of Public Health, Iran University of Medical Sciences, Tehran, Iran. E-mail address: rezavafa@yahoo.com

hypertension, hyperlipidemia, asthma, arthritis and decreased life expectancy (7). Moreover, obesity includes a wide range of effects on people's mental health, including behavioral problems, stress, depression, low self-esteem, social isolation and poor quality of life (8).

Obesity-related eating behaviors, such as higher energy intake, increased saturated fat and sugar intake and poor diet quality, has linked to stress. However, stress enhances physiological responses independent of the individual's eating behaviors and diets. For example, physiological stress responses increase activity of the sympathetic nervous system as well as hypothalamic-pituitary-adrenal axis and subsequently increase cortisol secretion, which is associated with increased lipogenesis and visceral fat accumulation. Therefore, stress can affect occurrence of obesity in two ways, including 1) dietary behaviors and diet quality and 2) biological processes (9). Due to the difficulty of treating obesity and its severe cardiometabolic and psychological complications, it is necessary to identify risk factors associated to overweight and obese (10). Considering the evidence that perceived stress is addressed as one of the causes of unhealthy changes in eating patterns, it is essential to investigate eating behaviors with perceived stress. Although several studies have been carried out on this topic, results could be further consistent. Therefore, this study was carried out to investigate relationships between the eating behaviors and anthropometric indices and perceived stress levels in healthy adult working women.

Materials and Methods

Study design and participants

This cross-sectional study was approved by the Ethics Committee of Iran University of Medical Sciences, Tehran, Iran (IR.IUMS.FMD.REC.1399.457), based on Declaration of Helsinki. In this study, informed consents were signed by the participants. Study was carried out on 395 healthy women (11) aged 20–50 years, working under the supervision of Iran University of Medical Sciences, Tehran, Iran. Inclusion criteria included no presence of acute or chronic diseases, no use of steroidal, non-steroidal anti-inflammatory drugs or laxatives, no use of drugs affecting weight statuses, no adherence to special diets and no pregnancy or lactation.

Measurements

In this study, data on general information, age, marital status and level of education were collected using checklists. Anthropometric data were measured, including weight, height, percentage of body fat mass (BFP), waist circumference (WC) and hip circumference (HC), and body mass index (BMI) and waist-to-hip ratio (WHR) were calculated. Special scale (OMRON Weight & Body Composition Scales, Japan) was used to measure weight and body fat percentages in compliance with standard rules. Tape measure was used to measure height, waist (mid-point at the end of the chest and above the pelvic bone) and hip (the most prominent part of the hip) circumferences. Nutritional behaviors, including self-reported speed of eating [slow (longer than 20 min), moderate (10–20 min) and fast (under 10 min)], breakfast eating (yes or no) and eating during screen watch (yes or no), were assessed. To assess the quantity of food intakes (calories, fats, carbohydrates, proteins and fibers), 2-d food recall questionnaires (one day off and one non-holiday day) (12) were used and associated data, including energy intakes, macronutrients and dietary fibers, were calculated using Nutritionist 4 software (Axxya Systems, USA). Physical activities were recorded based on the International IPAQ questionnaire (13) as Met-min per week. Furthermore, perceived stress levels were assessed using questionnaires (2). Questionnaires used in this study were widely assessed in previous studies (14-18). Participants were offered free nutrition consultation after finishing the interview.

Statistical analysis

In this study, SPSS software v.27 (IBM, USA) was used for data analysis. Descriptive statistics, including mean and standard deviation (SD) for normal quantitative variables, the median and quadratic amplitude for skew variables and number and percentage for qualitative data, were reported. Parametric tests such as t-test, analysis of variance and Pearson correlation coefficient or their nonparametric equivalents such as Mann-Whitney and Kruskal-Wallis or correlation coefficient were used to assess relationships between the quantitative and qualitative or quantitative variables shortly after checking normality of data using Kolmogorov-Smirnov test.

Results

In general, 395 female employees aged 20–50 y (average: 35.26 y) were participated in this study under the supervision of Iran University of Medical Sciences, Tehran, Iran. Moreover, 21.3% of the participants had diplomas or less, 50.9% had bachelor's degrees and 27.8% had higher degrees. Based on the statistical analysis, eating speed was significantly linked to WHR. This ratio was higher in participants with immediate consumption speed than those with slow pace ($p = 0.034$). Other anthropometric indices included no significant relationships with meal eating speed (Table 1).

Based on the results, significant relationships were seen between the consumption and non-consumption of breakfasts with weight ($p < 0.001$), BMI ($p < 0.001$), HC ($p < 0.001$), WC ($p < 0.001$), WHR ($p < 0.001$) and BFP ($p < 0.001$). No significant relationships were observed between the height with eating breakfasts or not (Table 2).

Table 1. Relationships between the meal eating speed and anthropometric indices

Speed of eating	Slow	Moderate	Fast	P-value**
Anthropometric indices				
Height (m)	1.631 (0.044) *	1.632 (0.041)	1.630 (0.044)	.952
Weight (Kg)	65.63 (10.30)	65.85 (11.86)	65.84 (9.69)	.391
BMI	24.62 (3.63)	24.68 (4.12)	24.00 (3.42)	.411
WC (cm)	78.70 (7.65)	79.08 (9.64)	77.21 (7.09)	.278
HC (cm)	108.40 (13.36)	107.79 (15.04)	103.81 (9.68)	.064
WHR	0.72 (0.037)	0.73 (0.041)	0.74 (0.039)	**.045****
BFP (%)	29.11 (7.21)	29.40 (8.27)	28.04 (7.88)	.429

Abbreviations: Body Mass Composition (BMI), Waist Circumference (WC), Hip Circumference (HC), Waist to Hip Ratio (WHR), Body Fat percentage (BFP).
The significance level was P-value< 0.05.
*The values are mean (standard deviation).
**Significant difference based on Independent-Sample T-Test.

Table 2. Relationships between eating breakfasts and anthropometric indices

Eating breakfast	Yes	No	P-value**
Anthropometric indices			
Height (m)	1.632 (0.042) *	1.628 (0.042)	.488
Weight (Kg)	66.32 (11.42)	60.86 (8.47)	**<.001**
BMI	24.86 (3.97)	22.94 (3.04)	**<.001**
WC (cm)	79.30 (8.94)	75.30 (7.41)	**<.001**
HC (cm)	108.61 (14.32)	99.80 (8.29)	**<.001**
WHR	0.73 (0.04)	0.75 (0.03)	**<.001**
BFP (%)	29.67 (8.03)	26.12 (6.35)	**<.001**

Abbreviations: Body Mass Composition (BMI), Waist Circumference (WC), Hip Circumference (HC), Waist to Hip Ratio (WHR), Body Fat Percentage (BFP).
The significance level was P-value< 0.05.
* The values are mean.
** Significant difference based on Independent-Sample T-Test.

Significant relationships were reported between eating during screen watch and weight (p = 0.015), BMI (p = 0.044), WC (p = 0.005), HC (p = 0.006) and BFP (p = 0.019). No significant relationships were reported between consuming meals while watching TV and height, WC, HC and WHR (Table 3).

Based on the results, no significant relationships were seen between the perceived stress level with the speed of eating meals, consumption or non-consumption of breakfasts and consumption or non-consumption of meals while watching TV or using mobile phones (Table 4).

Based on the results, significant relationships were seen between dietary intakes (total energy, fat, carbohydrate, protein and fiber intakes) with anthropometric indices (except height and WHR). The higher total energy and other micronutrient intakes were during the day, the higher the anthropometric indices were (Table 5). No significant relationships were observed between dietary intakes (total energy, fat, carbohydrate, protein and fiber intakes) and perceived stress levels (p = 0.51). Based on the results of Pearson correlation test, all anthropometric indices except height included significant relationships with physical activities (p < 0.001) as all desired anthropometric indices decreased with increases in physical activities (Table 5). No significant relationships were reported between the physical activities and perceived stress levels.

Table 3. Relationships between eating during screen time and anthropometric indices

Eating during screen time	Yes	No	P-value**
Anthropometric indices			
Height (m)	1.633 (0.042) *	1.625 (0.041)	.121
Weight (Kg)	66.16 (11.30)	62.91 (10.34)	**.015**
BMI	24.76 (3.89)	23.81 (3.85)	**.044**
WC (cm)	79.32 (9.02)	76.36 (7.74)	**.005**
HC (cm)	108.19 (14.24)	103.66 (12.11)	**.006**
WHR	0.735 (0.04)	0.738 (0.03)	.538
BFP (%)	29.59 (7.91)	27.37 (7.59)	**.019**

Abbreviations: Body Mass Composition (BMI), Waist Circumference (WC), Hip Circumference (HC), Waist to Hip Ratio (WHR), Body Fat Percentage (BFP).
The significance level was P-value< 0.05.
* The values are mean.
**Significant difference based on Independent-Sample T-Test.

Table 4. Relationships between the eating behaviors with stress levels

Eating Behaviors	Speed of eating	Eating breakfast	Screen time
Factor			
Stress	0.72*	0.37	0.06

The significance level was P-value< 0.05.
* The values are P-values.
** Significant difference based on Independent-Sample T-Test.

Table 5. Relationships between diet intakes and physical activities and anthropometric indices

Anthropometric Indices	Height (m)	Weight (Kg)	BMI	WC (cm)	HC (cm)	WHR	BFP (%)
Factor							
Diet intake*	r= -.012, p= .812	**r= .469, p= <.001**	**r= .499, p= <.001**	**r= .444, p= <.001**	**r= .434, p= <.001**	r= -.095, p= .059	**r= .474, p= <.001**
Physical Activity*	r= -.030, p= .546	**r= -.136, p= <.007**	**r= -.122, p= .015**	r= -.097, p= .053	**r= -.185, p= <.001**	**r= .223, p= <.001**	**r= -.130, p= .01**

Abbreviations: Body Mass Composition (BMI), Waist Circumference (WC), Hip Circumference (HC), Waist to Hip Ratio (WHR), Body Fat Percentage (BFP), Pearson correlation coefficient (r), P-value (p).
The significance level was P-value< 0.05.
* Significant difference based on simple linear regression

Discussion

Female participants aged 20–50 years were enrolled in this study to investigate relationships between dietary behaviors and anthropometric indices and perceived stress levels. Eating breakfasts as a dietary behavior significantly affected the anthropometric indices. Increased dietary intakes and decreased physical activities were responsible for changes in the anthropometric indices. Based on the wide range of participants (hospital service department employees, professors and doctors) of the present study in terms of age, occupation and education level, sampling could be close to the general population. Several participants ate their meals moderately fast and breakfasts were included in their food baskets. Due to the significant time, they spend in their workplaces, these working populations spend their free times eating meals and using social media such as watching TV and using mobile phones. Based on the study population, the average number of snacks consumed was less than that of the main meals. Working women needed further free times to eat exceptionally healthy homemade snacks. The average anthropometric indices in this study were in the range of healthy ideal individuals, as expected in fields of health activities and levels of higher education. Therefore, educating general population about nutrition literacy and self-awareness can help improve nutritional indices and control obesity in the society (19).

This study detected no significant relationships between the number of meals and snacks with anthropometric indices, which was expected based on the previous studies in this field (11, 20). In some studies, snack consumption exceptionally with high-volume and high-calorie ingredients has been addressed as a reason of increased abdominal obesity (21). In contrast, the current study

reported no relationships between the number of snacks and abdominal obesity. In this study, simultaneous consumptions of meals and snacks during use of mobile phones or watching TV were associated with the anthropometric indices and abdominal obesity since anthropometric indices were higher in participants who ate their meals during screen time, despite other studies (20). In contrast to the results of previous studies on decreasing abdominal obesity in people who ate breakfasts (22), the breakfast consumption increased several anthropometric indicators of the present study, including weight. Based on the study population, participants used corporate breakfasts that were prepared at work. Breakfasts served in hospitals and other centers under the supervision of Iran University of Medical Sciences contained high-calorie and low-nutritional values. Examples included jams containing preservatives, sugar halvas and bran-free breads. Therefore, it could be concluded that increases in anthropometric indices within the employees of the university were expectable due to the consumption of important meals in the workplace and lack of necessary standards in the meals.

In this study, no relationships were seen between the perceived stress levels and eating behaviors, including the speed of eating meals, eating breakfasts or not and eating meals while watching TV or using cell phones. Other studies have shown effects of perceived stress on increases of abdominal obesity. However, effects of this factor on eating behaviors are still unknown (7). As detected in other studies, increasing energy and micronutrient intakes during the day increases anthropometric indices (23). In the present study, anthropometric indices increased with increasing daily food and calorie intakes. Based on the results of this study, no relationships were observed between the perceived stress levels and daily food and energy intakes, meaning that people with higher stress levels constantly had their food intakes. As in other studies, anthropometric indices of the present study decreased with increasing physical activities. In general, body metabolism increases as physical activities increase, which justifies decreasing nutritional indices (24, 25). Unlike anthropometric indices, levels of physical activities did not affect the participants' perceived stress levels. However, the current study included limitations such as cooperation quality of the participants varied depending on their busyness due to the filling out questionnaires during work hours. Usually, participants had various abilities to accurately recall their consumed foods; hence, this part of the study might be affected by the bias in recalls. Despite limitations of the present study, filling out each questionnaire by a single researcher for an appropriate duration has made the information collected from this study quite reliable. Results collected from this study can be used as an introduction to the health planning of working women.

Conclusion

Eating breakfasts and increasing physical activities can change and improve anthropometric indices. Anthropometric indices increase with increasing food intakes, while no relationships are reported between the food intakes and physical activities and the perceived stress levels. Further investigations must be carried out with further participants in various work statuses to be able to come to better conclusions.

Ethics approval and consent to participate: This study was approved by the Ethics Committee of Iran University of Medical Sciences (IR.IUMS.FMD.REC.1399.457), regarding Declaration of Helsinki. Furthermore, informed consents were signed by the participants.

Consent for publication: The authors verify that written consents were collected from the participants for submission and publication. A copy of the consents for publication is available for review by the editor of the journal.

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