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Chronic stress is associated with anthropometrical markers in obese men

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Abstract

Review of research findings show a relationship between obesity and chronic stress. So the previous finding showed that chronic stress affects eating behaviors. This study aimed to determine correlation between chronic stress and anthropometrical markers as obesity indicators. Samples are ninety six obese men aged 35 – 50 years. At first, all participants completed a stress questionnaire with 32 questions in perfection of consciousness and wellbeing. Then, anthropometrical markers such as body mass index, body fat percentage and abdominal obesity were measured in all participants. Pearson correlation coefficient was used to determine the associations between chronic stress with anthropometrical markers. A significant positive correlation was found between chronic stress and all anthropometrical markers. To support some previous studies, our finding emphasizes on closely relation between stress affect feeding behavior and anthropometrical markers.

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Introduction

With changing lifestyles in both advanced and developing countries, the growing influence of stress on various aspects of human life has become more apparent. Obesity is also a serious problem not only in adults but also in children and adults as well as growing individuals. Nowadays obesity is recognized as a social problem as well as a health problem. At the moment one health problem confronting human communities is obesity and overweight and the irreversible complications arising from them. Prevalent obesity is an increasing epidemiological problem not only in developed countries but also in developing countries accounting for many deaths and diseases associated with obesity. Statistics of prevalence of obesity has been reported to be higher in some low-income countries than in developed countries (Moles *et al.,* 2006). Although most scientific resources identify positive energy balance and obesity as the primary cause of obesity, the question is whether overeating or eating frequently occurs only in response to hunger, or there are other factors encouraging a person to eat although his or her stomach is not empty. Perhaps here the role of stress or hormonal mechanisms or interaction between them can be considered in overeating or consuming food when one is not hungry (Yeomans *et al.,* 2009).

Any disorder that affects the mental and physical relaxation is called stress. Generally Stress is due to the need to adapt to the physical, psychological and emotional changes. Failure to control stress brings about disorders and diseases ranging from insomnia, ulcers, high blood pressure, asthma, and migraine while chronic fatigue and depression are among their consequences (Gerard H, 1998). Studies suggest a strong relationship between stress, eating behavior and obesity (Caredda *et al.,* 2009). Stress in daily life such as work strain, family or financial problems affect human's nutritional behaviors (Moles *et al.,* 2006; Yeomans *et al.,* 2009). Recent research evidence suggests that obese people have high stress levels, although the biological mechanisms responsible for this phenomenon are still not fully understood (Brydon *et al.,* 2008).

Despite these statements, an extensive cross-sectional study on a group of male and female employees revealed some kind of weak correlation between work stress and body mass index (Kouvonen *et al.,* 2005). In another study, stress-induced was found to be associated with overeating and obesity in women but not in men levels (Laitinen *et al.,* 2002). In another study, when mice eating normal meals were exposed to mild stress, the results showed that the weight of the mice that were stressed was lower than that of non-stressed mice (Bertiere *et al.,* 1984). Despite numerous studies on the role of stress in prevalence of obesity, there are few studies on the link between chronic stress levels and anthropometric determinants. Hence, the present study aims to determine the connection between chronic stress and anthropometric indices in a group of obese men.

Materials and methods

The research population consists of obese men (BMI ≥ 30) aged 35 to 50 years from Saveh City, Iran. The sample includes 96 obese men who are randomly selected from among the population. The subjects are non-athletes as they have not participated in any regular exercise program or diet over the past 6 months.

In this study, the participants first complete a stress questionnaire with 32 questions (Gerard H, 1998) in perfect health and perfect consciousness. Then the heights of the subjects are measured in standing positing without shoes on while their shoulder and backs are tangent with the wall an at accuracy of 0.1 cm. Subjects' weights are measured using Omron digital meter made in Finland, with precision of 0.1 kg with minimal clothing and without shoes on. Body mass index is calculated by dividing weight (in kilograms) by height (m). Percentage of body fat: measured by Omro Body Composition Measurement device made in Finland. Waist: Waist circumferences of the subjects are measured using a non-elastic tape without incurring any pressure on the body between

the last rib and the crest of the pelvis. Around hips: the hip circumference of the subjects is measured using non-elastic tape measure at the widest point, without imposing any pressure on the body usually through hip bone of the bumps. The waist/hip ratio of each subject was calculated as follows: hip/waist = WHR. To eliminate any personal error, all measurements were performed by a single person.

Statistical Analysis: Finally, the relationship between intended variables is established based on the objectives of the study using Pearson's correlation coefficient. Results are reported as mean ± standard deviations and the value of p is considered significant less than 0.05.

Results

Table 1 shows the baseline anthropometric indices in each study group. Facts and figures relating to each of the variables, especially BMI and body fat percentage of the subjects indicate that the subjects are classified as obese.

Table 1. Mean and standard deviation (SD) of anthropometrical markers and their significant levels of with chronic stress.

Variables	Mean	SD	significant levels of with chronic stress	
Age (year)	39.77	8.13	*ρ = 0.874*	*r = 0.018*
Weight (kg)	174.8	5.19	*ρ = 0.115*	*r = 0.178*
Height (cm)	99.6	12.6	*ρ = 0.001*	*r = 0.360*
Abdominal circumference (cm)	108	8	*ρ = 0.000*	*r = 0.428*
Hip circumference (cm)	109	9.7	*ρ = 0.000*	*r = 0.450*
Body mass index (kg/m2)	32.6	3.19	*ρ = 0.000*	*r = 0.321*
Body fat (%)	31.03	3.61	*ρ = 0.000*	*r = 0.413*
Visceral fat	14.7	2.36	*ρ = 0.000*	*r = 0.306*

Although no significant connection is found between chronic stress and age and height, there is a significant correlation between chronic stress and other anthropometric parameters such as weight, waist, hip circumference, body mass index, body fat percentage and visceral fat (see table 1).

Discussion and conclusions

Among factors influencing obesity are genetics, inactivity, hormonal disorders, and especially chronic stress in adults (Kumar *et al.,* 2007). The results of a longitudinal study show excessive depression in young girls to be associated with 2 to 3-fold increase of the prevalence of obesity (Richardson *et al.,* 2008). Some previous studies note the role of chronic stress on nutritional patterns or behaviors. The types of food consumed by people are reported to be different under stress conditions (Raspopow *et al.,* 2008). Stress increases hunger and the desire for high-calorie and high-fat foods (Gerard H, 1998). People with chronic stress often have a prevalence of overweight, abdominal obesity, type II diabetes and increased cardiovascular diseases (Dallman *et al.,* 2003).

The findings of the present study show that chronic stress levels affect the levels of obesity or anthropometric parameters. These findings suggest that chronic stress has a significant positive correlation with all anthropometric parameters such as weight, body mass index and the body fat percentage. In other words those who had higher levels of stress have a higher body fat percentage and weight. Moreover, the significant relationship between levels of stress and some indicators of abdominal obesity such as waist circumference and visceral fat further increases the importance of stress on abdominal obesity. Taken together, these findings

point out that although obesity is affected by several hormonal and environmental factors it seems that chronic stress dramatically affects obesity. The role of chronic stress in obesity induced by overeating is supported by some previous studies (Gerard H, 1998). Some recent studies note fat deposits in the abdominal area, especially in people with chronic stress (Schiffman *et al.,* 2000). In fact, for many people, the normal response to a stressful situation, is not avoid eating foods; but it is seeking to consume high-energy foods (Otto *et al.,* 2001; Kristenssson *et al.,* 2006). The responses of both acute and chronic stress are associated with physiological changes such as reducing the rate of purging the stomach (Bhatia *et al.*, 2005), increased blood pressure and other organic disorders (Cohen *et al.,* 2000). It should also be noted, however, that chronic stress can affect appetite directly or through some indirect routes (Rozen *et al.,* 1994; Hansen *et al.,* 2005). Of course depending of the type and severity of stress, eating behaviors such as bulimia and anorexia are affected differently. Confirming this, the findings of a study on mice show that infusion of mild stress in mice by continuously pinching their tails at presence of sweetened milk with an increased desire to eat and the consequent was weight gain (Rowland *et al.,* 1976).

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References

Bertiere MC, Mame Sy T, Baigts F, Mandenoff A, Apfelbaum M. 1984. Stress and sucrose hyperphagia: role of endogenous opiates. Pharmacology Biochemistry and Behavior **20,** 675–9. http://dx.doi.org/10.1016/0091-3057(84)90183-7

Bhatia V, Tandon RK. 2005. Stress and the gastrointestinal tract. Journal of Gastroenterology and Hepatology **20,** 332–9. http://dx.doi.org/10.1111/j.1440-1746.2004.03508.x

Brydon L, Wright CE, O'Donnell K, Zachary I, Wardle J, Steptoe A. 2008. Stress-induced cytokine responses and central adiposity in young women. International Journal of Obesity (Lond) **32(3),** 443-50. http://dx.doi.org/10.1038/sj.ijo.0803767

Caredda M, Roscioli C, Mistretta M, Pacitti F. 2009. Stress vulnerability and night eating syndrome in the general population. Rivista di psichiatria **44(1),** 45-54.

Cohen JI. 2000. Stress and mental health: a biobehavioral perspective. Issues in Mental Health Nursing **21,** 185–202. http://dx.doi.org/10.1080/016128400248185

Dallman MF, Pecoraro N, Akana SF, La Fleur SE, Gomez F, Houshyar H. 2003. Chronic stress and obesity: a new view of "comfort food." Proceedings of the National Academy of Sciences **100,** 11696–11701. http://dx.doi.org/10.1073/pnas.1934666100

Gerard H. 1988. Stress management: Self-Development for Success. American Management Association.

Hansen MJ, Schioth HB, Morris MJ. 2005. Feeding responses to a mela- nocortin agonist and antagonist in obesity induced by a palatable high-fat diet. Brain Research **1039,** 137– 45. http://dx.doi.org/10.1016/j.brainres.2005.01.063

Kouvonen A, Kivimaki M, Cox SJ, Cox T, Vahtera J. 2005. Relationship between work stress and body mass index among 45,810 female and male employees. Psychosomatic Medicine **67,** 577– 83. http://dx.doi.org/10.1097/01.psy.0000170330.08704.62

Kristenssson E, Sundqvist M, Astin M. 2006. Acute psychological stress raises plasma ghrelin in the rat. Egulatory Peptides **134(2-3),** 114–117. http://dx.doi.org/10.1016/j.regpep.2006.02.003

Kumar S, Mahabalaraju KD, Anuroopa MS. 2007. Prevalence of obesity and its influencing factor among affluent school children of Devanagere City. Indian Journal of Community Medicine **32,** 15-7. http://dx.doi.org/10.4103/0970-0218.53384

Laitinen J, Ek E, Sovio U. 2002. Stress-related eating and drinking behavior and body mass index and predictors of this behavior. Preventive medicine **34,** 29 –39. http://dx.doi.org/10.1006/pmed.2001.0948

Moles A, Bartolomucci A, Garbugino L, Conti R, Caprioli A, Coccurello R. 2006. Psychosocial stress affects energy balance in mice: modulation by social status. Psychoneuroendocrinology **31(5),** 623-33. http://dx.doi.org/10.1016/j.psyneuen.2006.01.004

Otto B, Cuntz U, Fruehauf E. 2001. Weight gain decreases elevated plasma ghrelin concentrations of patients with anorexia nervosa," European Journal of Endocrinology **5,** 669–673.

Raspopow K, Abizaid A, Matheson K, Anisman H. 2010. Psychosocial stressor effects on cortisol and ghrelin in emotional and non-emotional eaters: Influence of anger and shame. Hormones and Behavior **58(4),** 677-84. http://dx.doi.org/10.1016/j.yhbeh.2010.06.003

Richardson LP, Davis R, Poulton R, McCauley E, Moffitt TE, Caspi A, Connell F. 2008. A longitudinal evaluation of adolescent depression and adult obesity. International Journal of Eating Disorders **41(6),** 520-6.

Rowland NE, Antelman SM. 1976. Stress-induced hyperphagia and obesity in rats: a possible model for understanding human obesity. Science Journal **191,** 310 –2. http://dx.doi.org/10.1126/science.1246617

Rozen R, Brigant L, Apfelbaum M. 1994. Effects of cycles of food restric- tion followed by ad libitum refeeding on body composition and energy expenditure in obese rats. American Journal of Clinical Nutrition **59,** 560 –5.

Schiffman SS, Graham BG, Sattely Miller EA, Peterson-Dancy M. 2000. Elevated and sustained desire for sweet taste in African-Americans: a potential factor in the development of obesity. Nutrition **16,** 886 –93. http://dx.doi.org/10.1016/S0899-9007(00)00403-2

Yeomans MR, Coughlan E. 2009. Mood-induced eating. Interactive effects of restraint and tendency to overeat. Appetite **52(2),** 290-8. http://dx.doi.org/10.1016/j.appet.2008.10.006