

## INFLUENCE OF STRESS ON OBESITY

Pallavi Chitnis\*, Neelam Rane, Vinu Vij, Vijay kumar Gupta

Department of Physiology, Padmashree Dr D Y Patil Medical College and Hospital, Nerul, Navi Mumbai, India.

\*Corresponding Author Email: [pallavichitns@gmail.com](mailto:pallavichitns@gmail.com)

### ABSTRACT

**Background** - Obesity is fast assuming epidemic proportions throughout the world in both children and adults. This study has been done to analyze the correlation between stress and obesity. Stress is one of the contributing factors for obesity, as stressful conditions often lead to irregular diet, irregular sleep, addiction and lack of exercise. **Aim** – The present study was done to study the prevalence of stress in obese subjects. **Materials and Methods:** A total of 171 female students of 1<sup>st</sup> year medical and paramedical sciences, age group of 17-21 years were included in the study. According to BMI, the study population was divided into four groups - underweight, normal, overweight and obese. Perception of stress level was measured by the Perceived Stress Scale (PSS) which is the most widely used scale. **Result:** Perceived Stress Scale score was higher in the obese subjects as compared to the normal subjects, which was found to be statistically significant. Perceived Stress Scale score was lower in the underweight subjects as compared to the normal subjects which was statistically insignificant. **Conclusion:** Stress is one of the contributing factors for obesity. Effective counseling for management of stress helps to reduce obesity and its related complications. Longitudinal studies are needed, however, to support inclusion of stress management or mindfulness techniques in obesity prevention efforts.

### KEY WORDS

BMI, Overweight, Obese, Perceived stress scale (PSS), Stress

### INTRODUCTION

The high prevalence of obesity is a major public health problem because of the association of obesity with chronic health conditions such as coronary heart disease, type 2 diabetes, and some cancers <sup>[1]</sup>. Stress occurs when environmental demands tax or exceed the adaptive capacity of an organism; the demands result in physiological or psychological processes that put the organism at risk for disease <sup>[2]</sup>. Adults experience numerous types of stress (eg, work, finances, family), and each type contributes to overall stress. Perceived stress is associated with direct changes to both physiological (eg, hormonal response) and psychological processes. Chronically elevated

levels of perceived stress affect cortisol levels, which have been associated with increased risk for central obesity.<sup>[3]</sup> Chronic stress is assumed to have role in the development of obesity by interacting with mechanisms underlying energy intake and expenditure, and stimulating visceral fat accumulation in favour of abdominal obesity.<sup>[4]</sup> Stress is one of the contributing factors for obesity, as stressful conditions often lead to irregular diet, irregular sleep, addiction and lack of exercise. One important variable is how individuals use food to cope with stress and emotions. Eating has been recognized as a coping mechanism for alleviating and dealing with stress and emotions <sup>[5-8]</sup> by either under-eating or over-eating <sup>[9]</sup>.

Medical education is stressful throughout the whole course of training. The amount of material to be absorbed, social isolation, pressure of examination, discrepancies between expectation and reality all can be anticipated to bring psychological stress<sup>[10]</sup>. It is observed that people cope up with negative emotions generated by stressful events by engaging in emotional eating<sup>[11]</sup>. Emotional eating involves eating without hunger and usually without any planning. Thus, one is liable to eat unhealthy foods. Adolescents report that stress is associated with a shift towards unhealthy eating practices<sup>[12]</sup>.

## MATERIAL AND METHODS

A cross-sectional study was conducted on a total of 171 female students of 1<sup>st</sup> year medical and paramedical sciences, belonging to age group of 17-21 years. A signed consent was obtained from all the students. Stress was taken as an independent variable and overweight /obesity as the dependent variable.

Perceived Stress Scale (5 point) accepted worldwide for assessment of Stress was given in the form of Clinical Questionnaire to the subjects. The subjects filled the questionnaire. The 10-item scale assesses feelings and thoughts during the last month. The PSS measures the degree to which situations in one's life are perceived as stressful. It is more strongly related to life event impact scores as opposed to the number of stressful events, thereby representing one's appraisal of the events as being stressful. The subjects were asked to rate their feelings on a scale of 0-4, with 0 indicating never and 4 indicating very often. The PSS scores range from 0 to 40, with higher scores indicating higher levels of stress<sup>[13]</sup>.

BMI was categorized into four types: Underweight (<18.5), Normal (18.5- 24.9), overweight (25-29.9) and Obese (>30).<sup>[14, 15]</sup>

## Statistical Analysis

The results were expressed as mean  $\pm$  SD of each variable. The comparison between the mean values was performed by unpaired t test using graph pad software online. P-value of 0.05 or less was interpreted as significant for the analysis.

## RESULTS

Out of 171 students who filled the perceived stress test questionnaire, 12.87% were underweight, 54.39% were normal weight, 23.4% were overweight and 9.36% were obese.

**Table-I Distribution of Subjects:**

BMI	No. of Subjects
<18.5 (Underweight)	22
18.5-24.9 (Normal)	93
25-29.9 (Overweight)	40
>30 (Obese)	16

The mean  $\pm$  SD PSS scores of underweight, normal, overweight and obese subjects were  $15.045 \pm 5.65$ ,  $16.989 \pm 5.5$ ,  $18.02 \pm 6.01$  and  $17.75 \pm 7.41$  respectively. The maximum PSS scores were higher for overweight and obese subjects (34 and 36 respectively) as compared to the normal weight subjects i.e. 29. Comparison of PSS scores of obese subjects with normal weight subjects showed a p-value <0.001, which was statistically significant. In underweight subjects, the mean  $\pm$  SD PSS score was lower as compared to the normal weight subjects, but it was statistically insignificant.

**Table-II Correlation of PSS with BMI**

BMI	Mean	SD	SEM	Minimum	Maximum	p-Value
Underweight ( $<18.5$ )	15.045	5.65	1.205	2	22	$>0.1$
Normal ( $18.5 - 24.9$ )	16.989	5.5	0.57	4	29	$>0.1$
Overweight ( $25 - 29.9$ )	18.02	6.01	0.949	6	34	$>0.1$
Obese ( $>30$ )	17.75	7.41	1.852	11	36	$<0.001^*$

**\*p-value  $<0.05$  significant**

## DISCUSSION

In the present study, we have evaluated the stress level using PSS scores in 171 female students of 1<sup>st</sup> year medical and paramedical sciences. This study reveals high prevalence of stress in obese subjects as compared to the normal weight subjects.

People characterized as stress- or emotional-eaters tend to choose calorically dense foods to blunt their stress response or reduce negative emotions [3]. The relationship between restrained eating and stress is more complex; restrained eaters tend to eat less during normal conditions and overeat when stressed. [3] It has been widely reported that psychological stress and food consumption are related. [16, 17, 18]

Emotional eating has often been examined as a possible risk factor for obesity. [18, 19] In some people stress can induce overeating and in others, overeating can induce stress. The results of studies on stress and eating are mixed [20]. The consumption of comfort foods may lead to a more positive dispositional state for several reasons including sensory pleasure, reduction of hunger, and the diminution of aversive physiological symptoms. [21] Stress may contribute to HPA axis dysregulation, tendency to overeat, which in turn contributes to a cascade starting with obesity and ending with type 2 diabetes and CVD. [22]

Eating in response to emotions has been found to be a predictive variable for long-term change [23]. Blair, Lewis, and Booth [24] found that individuals who decreased their emotional eating lost substantially more weight than those who did not decrease their emotional eating. In addition, individuals who are overweight exhibit more compromised coping skills with greater severity of binge eating [25-27].

Geliebter and Aversa found that overweight [28] individuals have substantially greater eating ratings, indicating a greater urge to eat, in response to negative emotions and negative situations than normal weight individuals.

Prolonged sleep deprivation increases both food intake and energy consumption, as also a hormone imbalance is observed, leading to weight gain. [29]

Bjornto rp and Rosmond describe the neuroendocrine abnormalities associated with visceral obesity and report decreased cortisol variability in relation to increased abdominal obesity. [30, 31] A key component of obesity is intra-abdominal accumulation of fat, which is responsible for a great portion of the increased CVD risk associated with obesity [32]

## CONCLUSION

The present study shows that the stress levels are higher in obese subjects as compared to the

normal weight subjects. As obesity grows as a public health problem the challenge for health researchers and professionals is to develop more effective and innovative strategies for managing psychological stress which reduce stress induced eating. Effective stress management has been identified as an important factor in successful weight loss maintenance through increasing coping capacity<sup>[33, 34, 35]</sup>. The management of stress can be one of the modifiable risk factors among obesity and related disorders. Early identification of stress and aggressive management strategies are necessary to delay the onset and progression of obesity related complications.

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**\*Corresponding Author:**

**Pallavi Chitnis\***

*Department of Physiology,  
Pad. Dr D Y Patil Medical College and Hospital,  
Nerul, Navi Mumbai, India.*

*Email id – [pallavichitns@gmail.com](mailto:pallavichitns@gmail.com)*

*Telephone No. 9869480450.*