

No Evidence for Stress-Induced Sympathetic Activity in Young Women Classified as Restrained Eaters

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Citation: Laessle R, Lorig F (2018) No Evidence for Stress-Induced Sympathetic Activity in Young Women Classified as Restrained Eaters. *J Obes Overweig* 4(2): 204

Received Date: June 4, 2018 **Accepted Date:** December 18, 2018 **Published Date:** December 20, 2018

Abstract

Obesity has been linked to autonomic dysfunction, which is thought to be one of the main contributors for hypertension, cardiac remodelling and death. The aim of the present study was to investigate stress related changes in autonomous function in subjects at high risk for obesity (Restrained eaters). 33 healthy women aged 18-30 years were recruited through advertisement in local newspapers. Classification in restrained and unrestrained eaters was done according to norm tables from the German version of the Three Factor Eating Questionnaire. Participants were exposed to the Trier Social Stress Test, a standardized laboratory stressor. As an indicator of autonomous function the measurement of heart rate was performed. Restrained eaters did not respond with a significant increase in heart rate after stress. The results are interpreted with respect to consequences for nutritional intake and stress coping.

Keywords: Stress; Heart rate; Obesity; Dietary restraint

Introduction

Obesity has been linked to autonomic dysfunction, which is thought to be one of the main contributors for hypertension, cardiac remodelling and death. Exercise and diet-based weight loss are the mainstay therapy for obesity, but there is a paucity of data regarding the effect of weight changes in autonomic nervous system activity.

Diet and exercise based weight loss appears to increase parasympathetic and decrease sympathetic activity, the opposing effects being observed with weight gain. These findings are not uniformly reported in the literature, possibly due to differences in study design, methodology, characteristics of the participants and techniques used to estimate autonomic nervous activity [1].

Visona & George [2] reported a significant higher postexercise energy intake in women with high dietary restraint, but did not link their results to alterations in sympathetic activity. Further data of the contribution of alterations in the autonomous nervous system for the control of energy balance are reviewed by Messina *et al.* [3], who came to the conclusion that a positive energy balance may be a consequence which in turn promotes overweight.

Under normal circumstances sympathetic activity is increased as a consequence of stress. Little is known of this phenomenon in young women characterized by a high degree of dietary restraint, which makes them vulnerable to over eat, when cognitive control has been broken down and a dysregulation of intake may be a consequence. The present study therefore reports on stress induced changes in heart rate as an indicator of sympathetic activity.

Method

33 healthy women aged 18-30 years were recruited through advertisement in local newspapers. Exclusion criteria included oral contraceptive use, smoking, and regular alcohol consumption. To assess the presence of any of these exclusion criteria, participants were examined and interviewed by a physician. All women were paid for participation. Classification in restrained and unrestrained eaters for the present study was done according to norm tables from the German version of the Three Factor Eating Questionnaire [4]. 12 had a low restraint score, 21 were high in dietary restraint. Participants were exposed to the Trier Social Stress Test, a standardized laboratory stressor [5].

Measurement of heart rate was done by Einthoven-II-method with electrodes placed on thorax and forehead.

The data were statistically analyzed by MANOVA for repeated measurement.

Results

The table shows the mean stress dependent heart rate for restrained and unrestrained eaters

	No Stress	Stress
Restrained eaters	78,6 ± 8,1	94,4 ± 15,4
Unrestrained eaters	78,7 ± 12,4	90,4 ± 21,6

Table 1: Stress induced mean heart rate in restrained and unrestrained eaters

The stressor lead to a significant increase in heart rate $F(1,31) = 29,1$, $p < .001$, but there was no different increase between restrained and unrestrained eaters $F(1,31) = .63$, $p = .43$.

Cortisol data for the sample are available from a former study [6], and show lower cortisol after stress for the restrained eaters.

Discussion

The present study found a significant post stress activation of autonomous function, indicated by heart rate, but no such reaction specifically in restrained eaters.

Our results are in line with the data of [7], who also found lower sympathetic activity after challenge in a sample of adolescents. Women after short term dieting also had reduced autonomous response [8]. In a former study [9] we measured intake characteristics after stress in obese subjects high in dietary restraint. No sympathetic activation was found but restraint was associated to a lack of deceleration of eating rate during a laboratory meal. A reduced autonomous activation after stress may be associated with low coping resources that would be necessary to control intake after stress, and in turn promote obesity [10]. This interpretation is further supported by an investigation of Villada *et al.* [11] who found an adequate autonomous activation to be essential for constructive coping. The results of the study have to be interpreted under the constraint of several limitations. At the moment the sample size is small. Eating related hormones such as PYY or CCK could not be measured. Due to the necessity of standardization the study was done in the laboratory and therefore a transfer to the natural environment may be questioned.

Conclusion

Although the results have to be regarded as preliminary they suggest an altered autonomous function in restrained eaters associated with a dysregulation of short-term eating behavior that would promote obesity in the long-term.

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