

Study of Relationship between Body Mass Index & Autonomic Functions in Normal & Obese Adults of B.G. Nagara

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Abstract: As the standard of living is rising, obesity is emerging as a global epidemic in both children and adults. BMI is the marker of body fat content. Increase in BMI is not only the risk factor for coronary heart disease but also reduced ANS activity. However, the exact relationship between Increase in BMI & reduced ANS activity is lacking. Hence this study is the need of the hour to know the relationship between increases in BMI & ANS activity. This study was conducted to know the relationship between increases in BMI & ANS activity. The present study was a cross-sectional study consisting of 50 individuals in the age group of 20-40years. This study was conducted in the Department of Physiology, Adichunchanagiri institute of medical sciences, B.G.Nagara, Nagamangala Taluk, Mandya district, after the institutional ethical clearance and written consent from each participant AFT (BPRS-Blood pressure respond to standing) was recorded. The parameters thus recorded was analyzed for statistical significance using Students' t test and $p < 0.05$ was considered the level of significance. Blood pressure respond to standing was significantly decreased at ($p < 0.001^{**}$) in obese individuals (Group II) as compared to normal (Group I). The results of this study indicate that increase in BMI, is suggestive of decreased ANS activity.

Keywords: BMI - Body mass index. AFT- Autonomic function test, coronary heart disease

INTRODUCTION

As the standard of living is rising, obesity is emerging as a global epidemic in both children and adults. Prevalence and severity of obesity in adults is increasing worldwide. Obesity is becoming a serious public health problem in developing countries particularly in India. This increase in incidence of obesity is called as "New world syndrome" and is the reflection of massive social, economic & cultural problems faced by developing & developed countries [1]. At least 1 billion people worldwide are estimated to be overweight and at least 300 million people are estimated to be obese [2] In Karnataka 20% males & 27.3% are overweight & obese. This increase is caused by change in lifestyle involving eating habits & exercise [3]. BMI is the marker for body fat content [4]. ANS is the vital center for coordination of different body systems [5]. The autonomic dysfunction associated with obesity is not only the change in resting heart rate but also alter the responses to change in posture [6]. Previous studies strongly suggest that obesity is linked not only with higher risk factor coronary heart disease

but also reduced ANS activity [7]. Hence this study is the need of the hour to know the relationship between increases in BMI & ANS activity

MATERIALS & METHODS

Subjects were volunteers in the age range of 20 – 40 years, selected among the non teaching staff of AIMS B.G NAGAR. The subjects without the cardiovascular, endocrinal & neurological disorders were included in the study. The subjects with history of Hypertension, giddiness on standing, alcohol intake, smoking and taking drugs that are known to alter ANS activity were excluded in the study.

25 Subjects with normal BMI ($19 - 24.9 \text{ kg/m}^2$) was included in the Group I & 25 Subjects with BMI ($\geq 25 \text{ kg/m}^2$) was included in group II. The study was prior reviewed and approved by the Institutional ethical committee. Each subject gave a written consent before participating in the study.

A sample size of 50 subjects was calculated based on the results of a pilot study done on similar subjects.

The selected groups of subjects were called to AFT lab of Department of physiology. For all the subjects height (in cms) & weight (in Kgs) was measured. Height was measured with the subject in the standing posture with bare foot, nearest to 0.1 cms & weight was recorded in standardized weighing machine with minimum clothing's, nearest to 0.1 kgs. BMI was calculated using this height & weight.

Blood pressure response to standing – The subject rested comfortably in supine position for 15 minutes & then the subjects was asked to stand up unaided & remain standing. Systolic blood pressure (SBP) was recorded in resting supine position & again immediately when he stands up using mercury sphygmomanometer.

RESULTS

The parameters thus recorded were analyzed for statistical significance using Students ‘t’ test and p<0.05 was considered the level of significance. SBP was significantly decreased (p < 0.001**) in group II subjects on standing.

Table-1: BMI classification in the study

	BMI (kg /m ²)	Frequency	Percent
Group I	< 22.9	10	20
	23 – 24.9	15	30
Group II	25.1- 29.9	12	24
	>30	13	26

Table-2: Mean ± SD values of sympathetic function test parameter BPRS-(fall in SBP in mmHg) between group I and group II

Parameter	Group I (n==25)	Group II(n=25)	Significance
BPRS (SBP - mmHg)	4.83± 1.92	9.71 ± 1.67	< 0.001**

DISCUSSION

There was significant decrease in SBP in group II on standing (Table II). Akhter et al reported decreased BP response to standing indicating lower sympathetic nerve activity in obese person as compared to non-obese adults[8]. Thorat and Ghuge also showed positive correlation between BMI and orthostatic hypotension test in overweight group [9]. This decrease in SBP was probably because with change of posture from supine to standing the ANS acts to produce rise in heart rate & vasoconstriction in order to maintain blood pressure .Vasoconstriction is mediated through sympathetic innervations to blood vessels during standing [10]. Since in obese or overweight persons there is sympathetic dysfunction in the form of decrease in sympathetic activity fall in SBP is more.

Limitations of the study

The limitations of the present study were less number of the subjects.

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