(e) ISSN Online: 2321-9599

(p) ISSN Print: 2348-6805

Original Article

To Assess Correlation of BMI with Autonomic Function

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***ABSTRACT*:**

Background: Chronic imbalance of the autonomic nervous system is prevalent and potent risk factor for adverse cardiovascular events including mortality. The present study was conducted to assess relation of BMI with autonomic function. **Materials & Methods:** The present study was conducted on 120 subjects of both genders. The body mass index was calculated by using the formula wt[kg]/Ht[m^2].Weight was measured with help of weighing machine and height with the help of anthropometer. For parasympathetic function deep breath test and valsalva test were performed. For Sympathetic function hand grip test and orthostatic test were done. **Results:** Out of 120 subjects, males were 70 and females were 50. There was significant difference in valsalva test, deep breath test, orthostatic test and hand grip test in subjects with different BMI (P< 0.05). **Conclusion:** Authors found that there is a relationship of cardiovascular autonomic function with BMI. Sympathetic imbalance was seen in moderately obese and obese subjects.

Key words: autonomic function, BMI, Obese

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This article may be cited as: Singh S. To Assess Correlation of BMI with Autonomic Function. J Adv Med Dent Scie Res 2013;1(2):200-203.

INTRODUCTION

Chronic imbalance of the autonomic nervous system is prevalent and potent risk factor for adverse cardiovascular events including mortality.[1] Any factor that leads to inappropriate activation of the sympathetic nervous system can be expected to have an adverse effect on this measures. Any factor that augments vagal tone tends to improve outcome.[2] Factors linking obesity to increase BP and blood volume and cardiac output that is caused by increased metabolic demand. There is enough previous study to prove that sympathetic activity has been enhanced in obesity and increased vagal tone in people with underweight.[3] The autonomic nervous system (ANS) contributes to the modulation of the energy expenditure of the human organism. Heart rate variability (HRV) teases out the relative contribution of the sympathetic and parasympathetic branches of the ANS in the chronotopic control (i.e., timing of the heart beats) of the heart and therefore serves as an index and measurement of ANS activity.[4] While HRV has been extensively studied in obesity furthermore the influence of ANS activity on body weight in healthy, non-obese subjects is of interest. A recent short communication provided first evidence of an association between sympatho-vagal balance and body mass index (BMI) in healthy, non-obese adults.[5] The present study was conducted to assess relation of BMI with autonomic function.

MATERIALS & METHODS

The present study was conducted in the department of Physiology. It comprised of 120 subjects of both genders. The study was approved from ethical committee. All were informed regarding the study and written consent was obtained.

Data such as name, age, gender etc. was recorded. The body mass index was calculated by using the formula wt[kg]/Ht[m^2].Weight was measured with help of weighing machine and height with the help of anthropometer. For parasympathetic function deep breath test and valsalva test were performed. For Sympathetic function hand grip test and orthostatic test were done. Results were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 120		
Gender	**Males**	**Females**
Number	70	50

Table I shows that out of 120 subjects, males were 70 and females were 50.

Graph I Distribution of patients

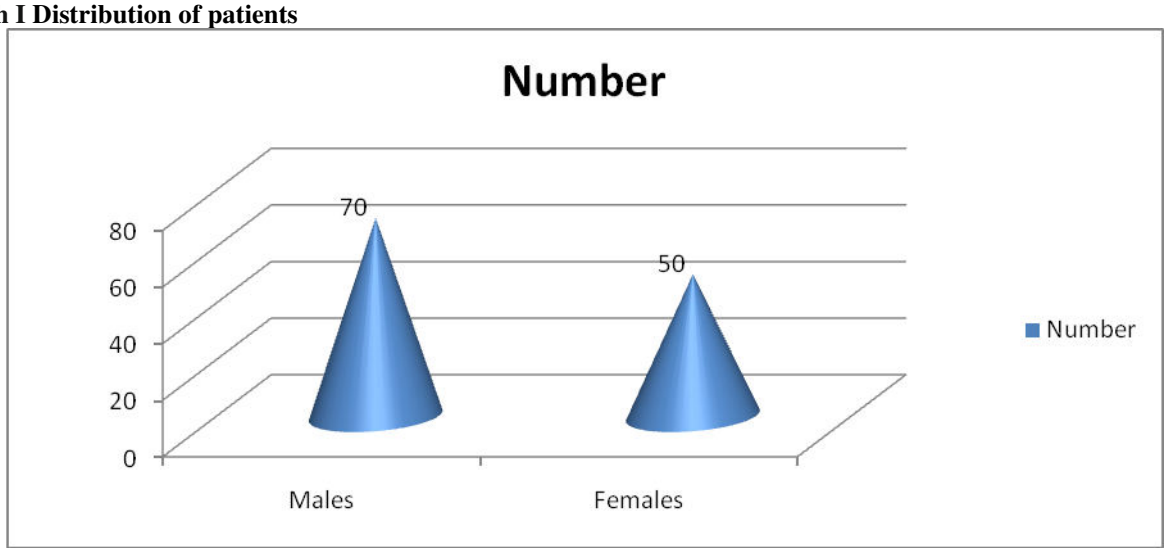
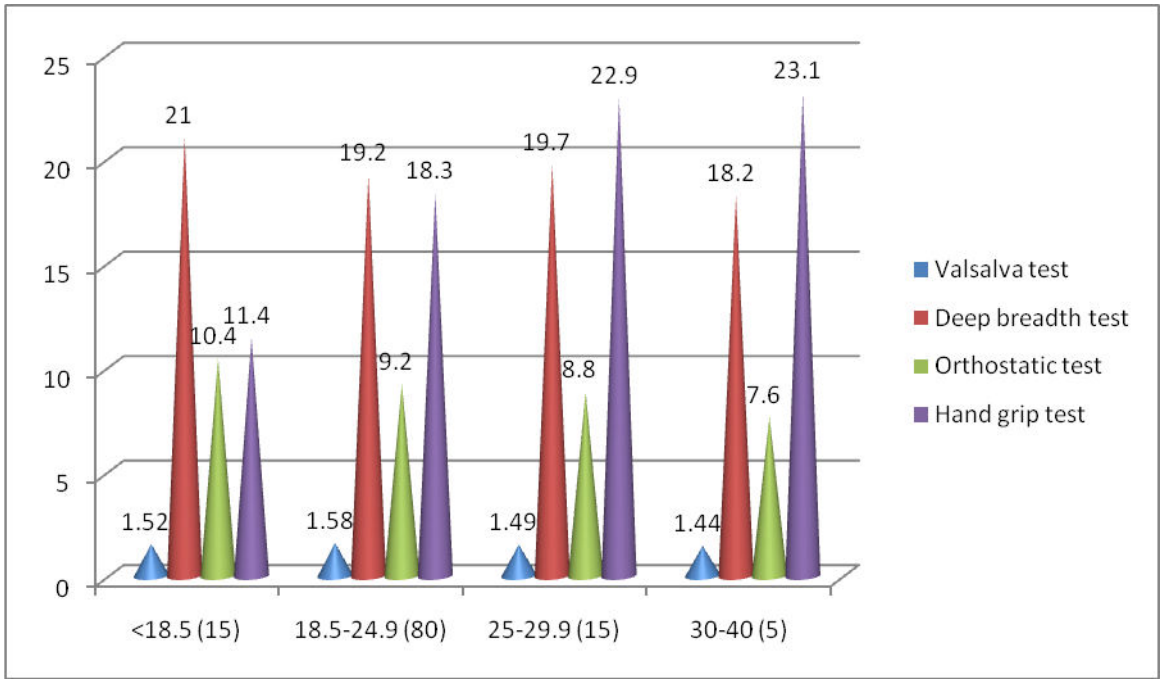


Table II Autonomic function test according to BMI

BMI	Valsalva test	Deep breadth test	Orthostatic test	Hand grip test
<18.5 (15)	1.52	21	10.4	11.4
18.5-24.9 (80)	1.58	19.2	9.2	18.3
25-29.9 (15)	1.49	19.7	8.8	22.9
30-40 (5)	1.44	18.2	7.6	23.1
P value	0.05	0.03	0.01	0.02

Table II, graph II shows that there was significant difference in valsalva test, deep breadth test, orthostatic test and hand grip test in subjects with different BMI (P< 0.05).

Graph II Autonomic function test according to BMI



DISCUSSION

The alteration in the cardiac autonomic nervous system measured in terms of heart rate variability (HRV) is found to be related to body mass.[6] There is evidence that sympathetic activity has been enhanced in obesity and an enhanced vagal tone in chronically undernourished subjects. Previous studies show complex relationships between various body mass indices, body fat and autonomic control of the heart. No BMI status was related to LF power but HF (high frequency) power and the LF/HF ratio differed among various body weight groups classified into underweight, normal weight, overweight and obese.[7] The present study was conducted to assess relation of BMI with autonomic function.

In present study, out of 120 subjects, males were 70 and females were 50. We found that there was significant difference in valsalva test, deep breadth test, orthostatic test and hand grip test in subjects with different BMI ($P < 0.05$). Hazarika et al[8] conducted a study to establish the relation of BMI on cardiovascular autonomic functions. Patients were divided into four groups according to BMI, normal, moderately obese, obese and underweight. Various autonomic tests such as deep breadth and valsalva ratio for parasympathetic function, and hand grip test and orthostatic hypotension test for sympathetic function were performed. It was seen that sympathetic activity increased as BMI increased and parasympathetic activity decreased as there was significant decrease in the valsalva ratio and deep breadth test in moderately obese and obese compared to the normal BMI. On the other hand there was a significant increase in handgrip test and orthostatic hypotension test in obese compared to that of normal BMI.

Goldstein et al[9] conducted a study in which a total of fifty-nine apparently healthy male (M) and female (F) individuals (M/F = 15/44) were included in the trial. HRV data for analysis was derived from 5 minutes of baseline recordings, while the subject was sitting on a comfortable chair. Subjects' body measures (weight and height) were taken and BMI was obtained according to common calculation (kg/m²). BMI was inversely related to pNN50 and RMSSD components of HRV. Statistically significant differences between stratified groups (BMI<20, BMI 20-25, BMI >25) only occurred for analysis of pNN50 components. The pNN50 components and RMSSD are strongly associated with cardiac vagal influence, and thus represents parasympathetic activity. The present data supports previous findings, that sympatho-vagal balance is related to BMI in non-obese, healthy individuals, providing evidence for a prominent role of the vagus nerve in the modulation of the energy expenditure of the human organism. Furthermore, this relation can be observed in short term recordings of HRV of 5 minutes in length.

Jarczok A et al[10] proved that for parasympathetic function R.R ratio during valsalva maneuver was significantly higher in obese compared to normal subject. These results furthermore provide insights to an unique association of ANS activity and energy expenditure modulation of the human organism, pointing out a prominent role of the vagus nerve. The present data supports previous findings, that sympatho-vagal balance is related to BMI in non-obese and healthy individuals.

CONCLUSION

Authors found that there is a relationship of cardiovascular autonomic function with BMI. Sympathetic imbalance was seen in moderately obese and obese subjects.

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