

A Comparative Study of Pre and Post-prandial BP Recordings in Obese and Non Obese Young Adults

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ABSTRACT

Introduction: Obesity is associated with varied combinations of abnormalities in the autonomic nervous system. Studies have shown that obese people who have a higher sympathetic tone have higher catecholamine levels. This can predispose to arrhythmogenesis and sudden death.

Aim: To study pre and post-prandial BP recordings in obese and non obese young adults in the age group of 18 to 45 years.

Materials and Methods: The study was conducted on 50 obese and 50 non obese patients admitted to our hospital over a period of three months. The patients are randomly selected and the BMI is calculated. Both systolic and diastolic blood pressure is measured in supine position of the right arm using digital electronic blood

pressure monitor. BP recordings are taken 30 minutes before and 30 minutes after meals. Then fall in BP is recorded.

Results: From this study we found that the mean systolic (pre-prandial 124.36, post-prandial 116.6) and diastolic blood pressure (pre-prandial 78.8 and post-prandial 75.4) is higher in obese than non obese patients. The study was statistically significant which was found by paired t-test ($p < 0.05$).

Conclusion: The fall in BP was significantly higher in obese (12 patients out of 50) than non obese (5 patients out of 50) patients. Probably obese patients had reduced cardiac sympathetic tone which caused post-prandial hypotension more than non obese patients.

Keywords: DBP-diastolic BP, Post-prandial hypotension, SBP-systolic BP

INTRODUCTION

Obesity is a major emerging health problem worldwide [1]. Influence of western culture is shifting the nutritional status of India gradually from undernourishment to obesity [1]. Many studies have shown the relationship between obesity and sudden deaths [1]. Obesity is associated with varied combinations of abnormalities in the autonomic nervous system [1]. Studies have shown that obese people who have a higher sympathetic tone have higher catecholamine levels; however there is also supportive evidence of reduced cardiac sympathetic tone in some studies [1].

After consumption of food, peptides are released in gastro intestinal tract, which leads to local vasodilatation. Hence, there is post-prandial redistribution of blood leading to shifting of large volume of blood into the gastrointestinal tract which in turn causes post-prandial hypotension [2]. In normal individuals, this is well compensated and does not lead to post-prandial hypotension [2]. Post-prandial hypotension is fall in the SBP of > 20 mmHg or reduction in the post-prandial SBP < 90 mmHg when pre-prandial BP is > 100 mmHg within two hours of meal [3]. In healthy and elderly individuals meal ingestion is associated with increase in the HR which serves to prevent significant fall in BP [3]. However, in patients with post-prandial hypotension this response is inadequate to maintain the BP. We hypothesized that food intake may result in a transient decrease in parasympathetic activity causing post-prandial hypotension.

MATERIALS AND METHODS

This is a comparative cross-sectional study which was conducted on 50 obese and 50 non obese patients in the age group of 18 to 45 years admitted to Srinivas Institute of Medical Sciences and research center over a period of 3 months. The study sample was chosen by random selection method and the BMI is calculated.

The BMI was calculated as

$$\text{BMI} = \frac{\text{Weight in kg}}{(\text{Height in meters})^2}$$

Category	BMI (kg/m ²)
Underweight	< 18.5
Normal weight	18.5-24.9
Over weight	25-29.9
Obesity (class 1)	30-34.9
Obesity (class2)	35-39.9
Extreme obesity (class 3)	> 40

[Table/Fig-1]: Classification of obesity based on body mass index

Subjects were classified into two groups based on BMI as follows:

Normal weight: BMI – 18.5 – 24.99 kg/m² [Table/Fig-1].

Obese : BMI > 30 kg/m²

Both Systolic and Diastolic blood pressure was measured in supine position of the right arm using digital electronic blood pressure monitor. BP recordings are taken 30 min before and 30 min after meals. Then fall in BP is recorded.

Inclusion Criteria

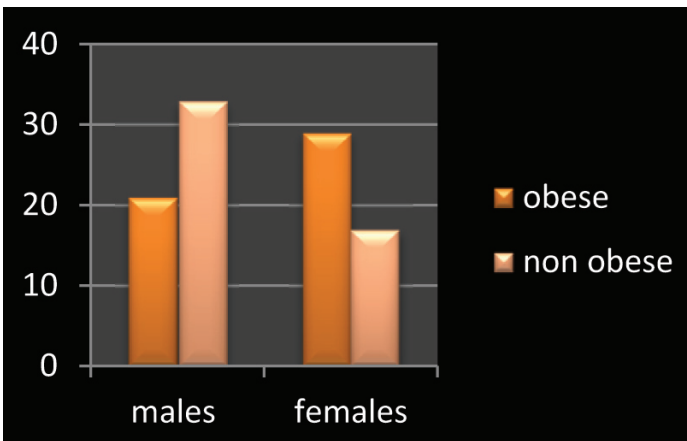
- All non obese adults between the age group 18 to 45 years.
- All obese adults in the same age group.

Exclusion Criteria

- Diabetes.
- Alcohol abuse.
- Antihypertensive drugs.
- Autonomic neuropathy.

RESULTS

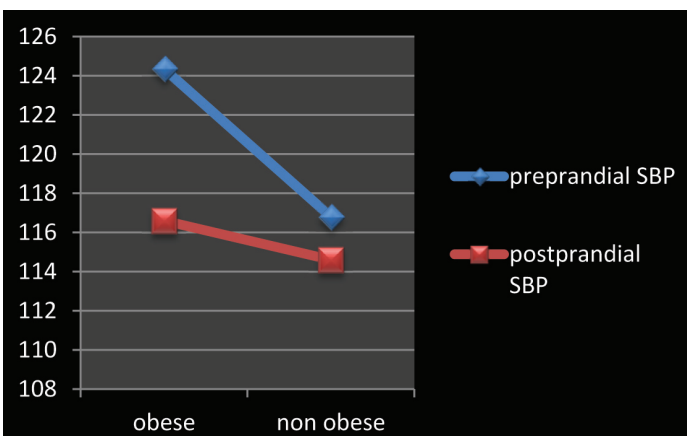
Statistical analysis was done using paired t-test. As depicted in [Table/Fig-2] out of 50 obese patients 21 were males and 29 were females. Out of 50 non obese patients 33 were males and 17 were females.



[Table/Fig-2]: Sex distribution of obese and nonobese patients

	Group	Mean	SD	T value	p-value
SBP pre-prandial	Non obese	117.2	14.14	2.56	<0.05
	Obese	124.36	13.77		
SBP post-prandial	Non obese	114.6	14.02	0.668	>0.05
	Obese	116.6	15.85		
Paired t value & P	T=0.309; p=<0.05				

[Table/Fig-3]: Comparison of pre-prandial and post-prandial SBP between non obese and obese patients



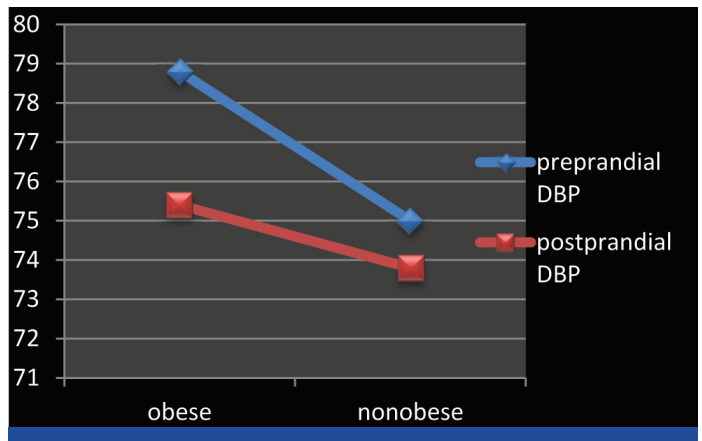
[Table/Fig-4]: Comparison of pre-prandial and post-prandial SBP between non obese and obese patient Graph.

As depicted in [Table/Fig-3,4] mean pre-prandial systolic blood pressure in non- obese and obese were 117.2 and 124.36 respectively whereas the post-prandial systolic blood pressure among non-obese and obese was 114.6 and 116.6 respectively which was found to be statistically significant.

	Group	Mean	SD	T value	p-value
DBP pre-prandial	Non obese	75	9.52	1.6	<0.05
	Obese	78.8	10.81		
DBP post-prandial	Non obese	73.8	10.66	0.559	>0.05
	Obese	75.4	9.52		
Paired t value & P	T=0.309; p=<0.05				

[Table/Fig-5]: Comparison of pre-prandial and post-prandial DBP between non obese and obese patients.

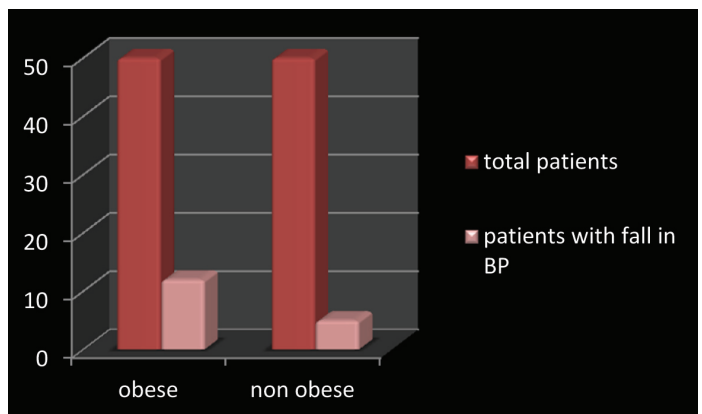
As depicted in [Table/Fig-5,6] mean pre-prandial diastolic blood pressure in non- obese and obese were 75 and 78.8 respectively whereas the post-prandial diastolic blood pressure among non-obese and obese was 73.8 and 75.4 respectively which was found to be statistically significant.



[Table/Fig-6]: Comparison of pre-prandial and post-prandial DBP between non obese and obese patients Graph.

	Total patients	No. of patients with fall in BP
Obese	50	12
Non obese	50	5

[Table/Fig-7]: Patients with fall in BP.



[Table/Fig-8]: Patients with fall in BP.

As depicted in [Table/Fig-7,8] out of 50 obese patients 12 had fall in blood pressure whereas among 50 non-obese patients 5 had fall in blood pressure.

DISCUSSION

From this study we found that the mean systolic and diastolic blood pressure is higher in obese than non obese patients. The study was statistically significant which was found by paired t-test. Thereby the fall in BP was significantly higher in obese than non obese patients. Studies done by Usha et al., and Ambarish et al., have also shown that post-prandial hypotension is significantly higher among obese individuals when compared to non-obese individuals [1,2]. We have hypothesized that there may be a decrease in parasympathetic activity after meals to compensate for the change in blood distribution thereby causing post-prandial hypotension. The studies done by Frenco et al., and Nagai et al., have shown that significant degree of autonomic dysfunction occurs in obese individuals [4,5]. These studies support the hypothesis of our study. In patients who are obese cardiac sympathetic tone is reduced, this has caused post-prandial hypotension more in comparison to non obese patients [6]. Imbalance in cardiac autonomic activity may predispose obese individuals to arrhythmogenesis and subsequently sudden deaths [7].

Post-prandial hypotension is associated with syncope, falls, weakness, angina, dizziness, visual disturbance and Cerebrovascular Accident (CVA) [8]. A strong association between falls and syncope

in elderly subjects with post-prandial hypotension has been established [9]. It has been suggested that orthostatic hypotension commonly caused by autonomic function, may contribute to effect of posture on post-prandial fall in BP. It has also been shown that orthostatic hypotension is additive to post-prandial hypotension rather than synergistic [10]. In elderly patients receiving multiple therapies for cardiovascular diseases, orthostatic and post-prandial hypotension should be taken care of.

LIMITATION

As not much studies are available on post-prandial hypotension among obese and non obese individuals, further study needs to be done in order to understand the pathophysiology and underlying mechanism behind the occurrence of post-prandial hypotension among obese individuals.

CONCLUSION

From the above study we conclude that post-prandial hypotension was significantly higher in obese than non obese patients. Post-prandial hypotension has received less attention, although it occurs more frequently than orthostatic hypotension and represents substantial cause for morbidity and mortality. However, there are very few studies which have shown correlation of post-prandial hypotension and obesity. Hence there is need for further studies on post-prandial hypotension in various groups.

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