

**CARDIOVASCULAR PARAMETERS IN OBESE & NON OBESE INDIVIDUALS: A COMPARATIVE STUDY FROM CENTRAL INDIA****Dr. Gajendra Manakshe¹, Dr. Anil Jawahirani²**¹Assistant Professor, Dept of Cardiology, Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Science (DU), Sawangi (M), Wardha.²Associate Professor Cardiology Jawaharlal Nehru Medical College Datta Meghe Institute of Medical Sciences Sawangi, Wardha**ABSTRACT**

AIMS: Obesity can be classified as generalized obesity (GO) and abdominal obesity (AO) and obese population have higher rates of mortality and morbidity compared to non-obese individuals. This study was undertaken to analyse the differences in certain well defined cardiovascular parameters in obese and non-obese subjects in the age groups of 21-60 years.

METHODS A sample of 150 male and 150 female obese patients with body Mass Index $> 30 \text{ kg/m}^2$ and also 150 male and 150 female non obese patients with body Mass Index of $18.50 - 24.99 \text{ kg/m}^2$ were selected. Parameters such as heart rate, systolic blood pressure, diastolic blood pressure, mean blood pressure and pulse blood pressure were assessed.

RESULTS: In our study, there was a statistically significant increase in heart rate, systolic blood pressure and diastolic blood pressure in obese subjects when compared to non-obese in all age group. There was a positive correlation between body mass index and heart rate, systolic blood pressure, diastolic blood pressure, mean blood pressure and pulse blood pressure. The degree of rise was higher for the systolic blood pressure than the diastolic blood pressure.

CONCLUSIONS: Although our study is by no means exhaustive, it does provides a glimpse into the variety of adaptations in cardiovascular structure and function that occur as excessive adipose tissue accumulates, even in the absence of overt disease.

INTRODUCTION:

There are number of clinical parameters which can be used to determine susceptibility to cardiovascular diseasesⁱ. These measurements include body mass index (BMI), waist-hip ratio (WHR) and waist circumference (WC). Body Mass Index (BMI) is recognized as one of the most useful indices for obesity in adults. BMI is determined by dividing weight (wt) in kilograms by height (ht) in meters squareⁱⁱ. Approximately 2.8 million people are dying each year due to obesity. Earlier obesity was associated with high-income countries, but now it is also prevalent all over the worldⁱⁱⁱ.

According to CDC (Centre for disease prevention and control), Atlanta The prevalence of obesity was 39.8% and affected about 93.3 million of US adults in 2015-16. Obesity-related conditions include heart disease, stroke, type 2 diabetes and certain types of cancer that are some of the leading causes of preventable, premature death. The estimated

annual medical cost of obesity in the United States was \$147 billion in 2008 US dollars; the medical cost for people who have obesity was \$1,429 higher than those of normal weight^{iv}.

In India, obesity is emerging as an important health problem particularly in urban areas. According to National family health survey India-3 (NFHS-3), 13% of women (15-49 Years) and 9 % of men (15-49 Years) were overweight or obese in 2005-06. World Health Organization (WHO) has defined overweight and obesity as abnormal or excessive fat accumulation that presents a risk to health. A commonly used simple measure to classify overweight and obesity in adults is body mass index (BMI). BMI is defined as a person's weight in kilograms divided by the square of his height in meters (kg/m^2). WHO defines overweight when BMI is greater than or equal to 25; and obesity when BMI is greater or equal to 30 but in Asians, the cut-offs for overweight ($\geq 23.0 \text{ kg/m}^2$) and

obesity ($\geq 25.0 \text{ kg/m}^2$) are lower than WHO criteria due to risk factors and morbidities^v.

In India overweight or obesity is seen in 30-65% of adult urban population^{vi}. ICMR-INDIAB Study showed that today the prevalence of generalized and abdominal obesity was higher in India compared to earlier studies^{vii}. Obesity has been recognized as a major independent risk factor for cardiovascular diseases^{viii}. Systolic blood pressure is the most consistent and significant risk factor for CVDs compared to the diastolic blood pressure and there is a relationship between body mass index and cardiovascular parameters among obese persons.

MATERIAL AND METHODS

AIM: Comparison of cardiovascular parameters between obese and normal individual

This prospective study was carried out in the Jawaharlal Nehru medical college and hospital from January 2017 to December 2017.

A sample of 150 male and 150 female obese patients with body Mass Index $> 30 \text{ kg/m}^2$ and also 150 male and 150 female non obese patients with body Mass Index of $18.50 - 24.99 \text{ kg/m}^2$ were selected. Sample was randomly selected. A pilot study was carried out on 20 patients to ensure feasibility, and time needed for completing the study.

All the patients were assured that participation in the study was voluntary. Verbal consent was obtained from patients who accepted to take part in the study. Written informed consent was taken from all the participants included in the study. Ethical clearance was obtained from the research

ethical committee of the institute. Anonymity and the confidentiality of responses were assured to all the participants. Socio demographic data was obtained from patients which includes age, occupation, educational level and smoking status. Cardiovascular parameters were recorded including first; blood pressure that was measured on left/right arm by auscultatory method using mercury sphygmomanometer at dorsal comfortable position in bed. After getting the systolic and diastolic readings, mean arterial blood pressure was calculated. Pulse pressure was calculated by calculating the difference between the systolic and diastolic blood pressure. Pulse rate was calculated by palpation of radial pulse. Anthropometric measurements were obtained including measuring body weight. Height was measured by tape measure marked in centimetre with the patient in standing position by marking the point on the wall. BMI was calculated as weight in kilograms divided by squared height in meter. Conventional BMI cutoff points were applied to classify the study populations into normal BMI ($18.5 \leq \text{BMI} < 30 \text{ kg/m}^2$).

Descriptive data are presented as Mean and Standard Deviation and Range values. Unpaired student's t-test was used for groups comparison. Pearson's correlation coefficient was used to measure the relationship between the measurements. A p-value of 0.05 or less was considered to be statistical significant.

RESULTS

A total of 400 participants were included in the study of which 200 were obese and 200 were non obese subject.

TABLE 1: Age and gender distribution of obese and non obese participants

Variable	Male (n,%)	Femalea (n,%)	Total
Obese	150 (100%)	150 (100%)	300
Non Obese	150 (100%)	150 (100%)	300

TABLE 2: Comparison of mean age, anthropometric measurements and cardiovascular parameters

parameter	Obese			Non obese		
	Male (M± SD)	Female (M± SD)	P value	Male (M± SD)	Female (M± SD)	P value
Age	55.91±13.14	53.32±11.22	0.3471	54.25±15.34	52.14±13.71	0.4102
Weight(in kgs)	76.23±9.72	79.41±11.45	0.3123	63.32±6.79	61.45±7.01	0.2987
Height(in mts)	1.56±0.3	1.51±0.2	0.0511	1.57±0.81	1.53±0.56	0.032
BMI	32.01±1.98	34.14±2.93	0.0001	22.94±1.19	23.51±1.93	0.011
Heart rate	82.21±10.75	85.33±11.56	0.0230	85.61±9.67	86.11±8.87	0.7502
Systolic BP	130.61±13.54	127.03±12.42	0.0532	118.21±8.61	116.8±8.93	0.4624
Diatolic BP	81.33±13.51	78.94±12.34	0.2985	79.43±10.23	77.87±8.4	0.2981
Pulse pressure	49.44±16.57	46.55±14.86	0.4324	41.62±15.22	40.71±13.34	0.5319
Mean arterial pressure	94.23±18.15	91.43±15.90	0.0197	90.25±11.38	88.12±12.01	0.4962

Highly significant correlation was found in cardiovascular parameters of obese and non-obese persons.

DISCUSSION

Obesity is associated with a significant morbidity and mortality, and life expectancy decrease from 5–10 years^{ix}. Cardiovascular diseases and cancer-associated mortalities are significantly increased in persons with obesity^x. For a BMI of 25.0 to <30.0 kg/m², the Hazard ratio (HR) was 1.11 (95% confidence interval [CI] 1.10, 1.11), and this increased to 1.44 (1.41, 1.47), 1.92 (1.86, 1.98), and 2.71 (2.55, 2.86) for a BMI of 30.0 to <35.0, 35.0 to <40.0, and 40.0 to <60.0 kg/m², respectively^{xi}.

Obesity is considered to be a chronic disease which is associated with a wide range of complications affecting many different aspects of physiology^{xii}. Coronary artery disease, obesity-associated cardiomyopathy, left ventricular hypertrophy, essential hypertension, cor pulmonale, accelerated atherosclerosis, pulmonary hypertension of obesity, dyslipidemia, chronic heart failure (CHD), left ventricular hypertrophy (LVH), cardiomyopathy, pulmonary hypertension, lymphedema (legs) are some of the complications associated with the obesity. Other conditions like Cancer/malignancy, Gastrointestinal, Genitourinary, Musculoskeletal, Neurological and central nervous system are also associated with the obesity^{xiii,xiv}.

Most of the times Obesity is defined as a condition of abnormal or excessive fat accumulation in adipose tissue, to the extent that health may be impaired. Body Mass Index provides the most useful, and accurate, population-level measure of obesity. It can be used to estimate the prevalence of obesity within a population and the risk factors associated with it. Due to obesity there is increase in the total blood volume and cardiac output due to increased metabolic demand induced by excess body weight. Left ventricular hypertrophy can be caused by the increase in blood volume in turn increases venous return to the heart, increasing filling pressures in the ventricles and increasing wall tension which progress to diastolic dysfunction and if tension still increases further, can lead to systolic dysfunction and thus obesity may predispose to heart failure^{xv}.

Our study has compared the measurements and cardiovascular parameters among obese and non obese patients in relation to sex and found that there is only significant statistical difference between obese male and female regarding body mass index and systolic blood pressure. study is consistent with Bakari et al 2006^{xvi}. After comparison of systolic blood pressure among obese and non obese male and female patients, the

findings revealed that there is significant statistical difference between obese male and female, and systolic blood pressure is slightly higher in male than female also diastolic blood pressure was higher in male. This finding was in accordance with Bose et al^{xvii}.

Our study has shown the statistical significance in cardiovascular parameters of obese and non obese persons with regard to systolic, diastolic, mean arterial pressure and pulse pressure parameters. These findings were in consistent to study by Arkan et al^{xviii}. In our study, there was a statistically significant association in systolic blood pressure in obese subjects when compared to non-obese subjects. There was also a positive correlation with increasing BMI causing further consistent increases in systolic blood pressure and diastolic blood pressure. Correlation between BMI and blood pressure indices; was assessed by Ravi Sankar P et al. and found that systolic blood pressure, Systolic blood pressure and mean arterial pressure were lowest in underweight and highest in overweight subjects. Heart rate was increased in overweight subjects which was in cinsistant with our study^{xix}.

CONCLUSION

The present paper shown the correlation between body mass index and cardiovascular parameters among obese and non-obese. the mean body mass index is greater in obese male than obese female. The strong association of obesity with cardiovascular disease necessitates the importance of prevention and control of obesity and it should begin in early child hood also proper diet and regular medical checkup should be carried out to cope up with the problem of obesity.

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- ^{iv} <https://www.cdc.gov/obesity/data/adult.html>

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