

## EFFECT OF HYPERTENSION ON BODY MASS INDEX AND TOTAL CHOLESTEROL LEVELS AS RISK FACTORS IN ISCHEMIC HEART DISEASES

KHALID AMJAD KIYANI,<sup>1</sup> WAQAR AZIM,<sup>2</sup> MOHSIN SHAFI<sup>2</sup> AND TARIQ M. MALIK<sup>2</sup>

<sup>1</sup>Departments of Pathology, Combined Military Hospitals, Rawalpindi and Lahore  
and National University of Science and Technology, Islamabad – Pakistan

*Introduction:* Dyslipidaemia and hypertension are important predisposing factors leading to cardiovascular diseases. Obesity also increases the risk of hypertension, coronary artery disease and dyslipidaemia.

*Objective:* Purpose of this study was to find out a relationship between body mass index and total cholesterol levels in 100 hypertensive patients.

*Materials and Methods:* Study was performed in Chemical Pathology Department of Army Medical College, Rawalpindi in collaboration with Department of Medicine, Combined Military Hospital, Rawalpindi. It is a cross – sectional study and simple non-probability random sampling was used. Hundred hypertensive patients were included in the study. Data was recorded using a detailed proforma and analysis was done on SPSS version 17.

*Results:* Of the 100 hypertensive patients included in the study, there were 39 males while 61 were females. The mean age was  $60.1 \pm 11.5$  years. The mean blood pressure was  $171 \pm 13.1/105.2 \pm 6.6$  mm of Hg. Mean body mass index was  $28.6 \pm 3.97$ . Mean of total cholesterol was  $5.7 \pm 0.7$  mmol/L in all the patients.

*Conclusion:* Hypertension, dyslipidaemia and increased BMI increase go hand in hand with the risk of cardiovascular disease. Treatment strategies should be adopted to treat hypertension and dyslipidemia aggressively and lifestyle modifications are necessary for reducing BMI.

*Key word:* Hyperlipidemia, BMI, Hypertension, Cardiovascular Diseases.

### Introduction

Hypertension combined with obesity and dyslipidaemia are very important factors leading to cardiovascular diseases.<sup>1</sup> People in developing countries are more prone to become obese than the developed world<sup>2</sup> and associated with a risk of developing cardiovascular diseases. All of the components of the dyslipidaemia, including high triglycerides, decreased HDL levels, and increased LDL particles, have been shown to be atherogenic.<sup>3</sup> Dyslipidaemia can also lead to hypertension and vice versa. Therefore hypertension and dyslipidaemia should be diagnosed as early as possible to prevent the risk of cardiovascular diseases. Body mass index (BMI) is used for relating the weight of an individual with height and is defined as weight in kilograms divided by height in meters square.<sup>4</sup> The International Association for the Study of Obesity and the International Obesity Task Force have suggested lower BMI cutoff values for the definition of overweight ( $23.0 - 24.9$  kg/m<sup>2</sup>) and obesity ( $25.0$  kg/m<sup>2</sup> or greater) in Asian populations.<sup>5</sup> Aim of our study was to establish a relationship between obesity and dyslipidaemia in hypertensive patients.

### METHODOLOGY

This study was performed in Chemical Pathology Department, Army Medical College, Rawalpindi, National University of Science and Technology, Islamabad in collaboration with the Department of Medicine, Combined Military Hospital, Rawalpindi from Feb' 2011 to June' 2011. Hundred hypertensive patients reporting to the department of medicine were included in the study. Detailed history was taken from each patient and physical examination was done. Anthropometric measurements were taken. Blood pressure was calculated using a sphygmomanometer and was taken twice at an interval of 5 minutes. Mean of both the values was taken. Fasting blood samples were taken for the calculation of cholesterol level and they were analysed on fully automated chemical pathology analyser. All the data was recorded on a specially designed proforma and statistical analysis was done using SPSS version 17.

### RESULTS

Our results showed that out of the 100 hypertensive patients, there were 39 males and 61 were females. The mean age was  $60.1 \pm 11.5$  years. For males the

**Table 1:** The mean  $\pm$  SD for age, systolic and diastolic blood pressure, total cholesterol and BMI.

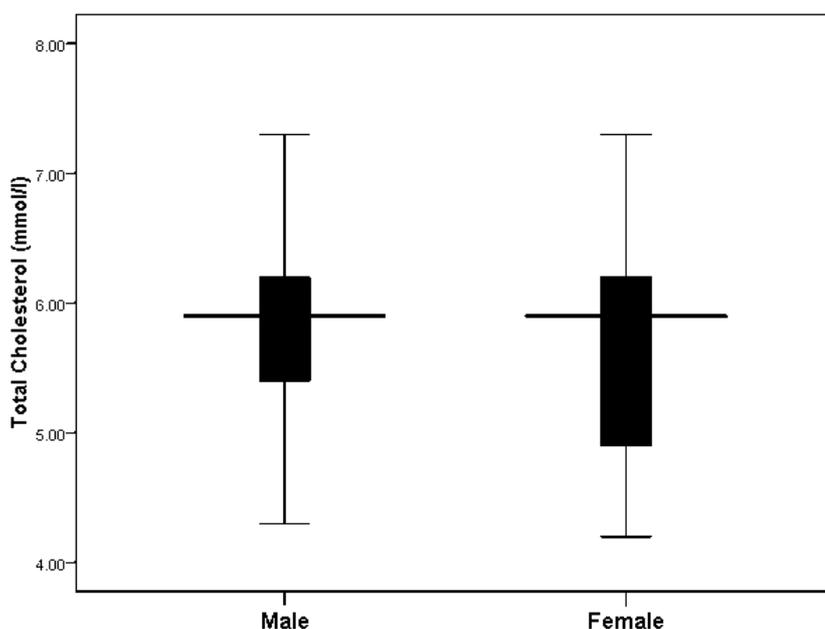
	Age (Years) Mean $\pm$ SD	Systolic BP (mm of Hg) Mean $\pm$ SD	Diastolic BP (mm of Hg) Mean $\pm$ SD	Total Cholesterol (mmol/L) Mean $\pm$ SD	BMI
All patients (n = 100)	60.1 $\pm$ 11.5	171 $\pm$ 13.1	105.2 $\pm$ 6.6	5.7 $\pm$ 0.7	28.6 $\pm$ 3.97
Males (n = 39)	58.6 $\pm$ 12.2	170.6 $\pm$ 12.6	105.5 $\pm$ 5.7	5.8 $\pm$ 0.7	27.0 $\pm$ 3.2
Females (n = 61)	61.9 $\pm$ 10.8	171.2 $\pm$ 11.1	104.9 $\pm$ 7.1	5.6 $\pm$ 0.7	29.6 $\pm$ 4.1

mean age was  $58.6 \pm 12.2$  year while for female patients it was  $61.9 \pm 10.8$  years (Table 1). Mean value for body mass index was  $28.6 \pm 3.97$  while it was  $27.0 \pm 3.2$  in males and  $29.6 \pm 4.1$  in females (Table 1). The mean systolic blood pressure was  $171 \pm 13.1$  mm Hg and mean diastolic pressure was  $105.2 \pm 6.6$  mm of Hg. In males, the mean systolic blood pressure was  $170.6 \pm 12.6$  mm of Hg while mean diastolic pressure was  $105.5 \pm 5.7$  mm of Hg. In females, the mean systolic blood pressure was  $171.2 \pm 11.1$  mm of Hg while mean diastolic pressure was  $104.9 \pm 7.1$  mm of Hg (Table 1). Mean of total cholesterol was  $5.7 \pm 0.7$  mmol/L in all the patients while it was  $5.8 \pm 0.7$  mmol/L in male patients and  $5.6 \pm 0.7$  mmol/L in female patients (Table 1). Figure I show the box plot of total cholesterol levels in both male and female patients.

However no positive correlation (p-value) could be established between either hypertension and cholesterol levels and hypertension and BMI.

## DISCUSSION

Over weight and obesity leads to adverse effects on hypertension, blood cholesterol and insulin resistance.<sup>6</sup> As the body fat increases, there is an increased risk of developing hypertension and diabetes. As is shown in our study that the mean value of body mass index was  $28.6 \pm 3.97$  which clearly showed that the majority of individuals were in the obese category. A positive correlation of Hypertension and BMI was shown in a study carried out by Hamayun et al<sup>7</sup> but no such relationship could be established in our study. Generally it is seen that as the BMI increases, dyslipidaemia also increases. This is evident by the fact that the mean total cholesterol in our study was  $5.7 \pm 0.7$  mmol/L, which is also shown

**Fig. 1:** Box plot showing values of total cholesterol in males and female.

by a study carried out by Hamayun et al.<sup>8</sup> Another interesting feature was that out of the 100 hypertensive patients, 42 were found to be diabetic, which is another risk factor for progression to cardiovascular diseases.

It is **concluded** that dyslipidaemia, hypertension and high BMI increase the risk of cardiovascular diseases, therefore treatment strategies are to be adopted so as to treat dyslipidaemia and hypertension aggressively and lifestyle modifications should be made so as to decrease the BMI.

## REFERENCES

1. Khot UN, Khot MB, Bajzer CT, Sapp SK, Ohman EM, Brener SJ, Ellis SG, Lincoff AM, Topol EJ: Prevalence of conventional risk factors in patients with coronary heart disease. JAMA 2003; 290: 898-904.
2. Friedrich MJ. Epidemic of obesity expands its spread to developing countries. JAMA 2002; 287: 1382-6.
3. Howard, B.V, G. Ruotolo and D.C. Robbins. Obesity and dyslipidemia. Endocrinol Metab Clin North Am., 2003; 32 (4): 855-867.

4. Definition of Body Mass Index available at **Error! Hyperlink reference not valid.**
5. Choo V. WHO reassesses appropriate body – mass index for Asian populations. *Lancet* 2002; 360: 235. World Health Organization. Obesity and Overweight Facts. **Error! Hyperlink reference not valid.**
6. Hamayun A, Sher Shah A, Sultana R. Relationship of hypertension with body mass index and age in male and female population of Peshawar, Pakistan. *J Ayub Med Coll Abbottabad* 2009; 21 (3).
7. Hamayun A, Sher Shah A, Alam S, Hussein H. Relationship of body mass index and dyslipidemia in different age groups of male and female population of Peshawar. *J Ayub Med Coll Abbottabad* 2009; 21 (2).