

**Study on Association of Lipid Profile and Hypertension****Puduri Rajendra Prasad<sup>1</sup>, Ch Sandeep Kumar<sup>2</sup>, Srikanth Peddi Reddy<sup>3</sup>**<sup>1</sup>Assistant Professor, Department of General Medicine, Government Medical College, Jagtial, Telangana<sup>2</sup>Assistant Professor, Department of General Medicine, Government Medical College, Jagtial, Telangana<sup>3</sup>Assistant Professor, Department of General Medicine, Government Medical College Jagtial, Telangana

Received: 04-01-2024 Revised: 15-01-2024 / Accepted:20-02-2024

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Conflict of interest: Nil

**Abstract**

Abnormalities in serum lipid and lipoprotein levels (dyslipidemia) are recognized as major modifiable cardiovascular disease (CVD) risk factors and have been identified as independent risk factors for essential hypertension giving rise to the term dyslipidemic hypertension. The objective of this study was to examine the serum lipid patterns of newly diagnosed hypertensive patients attending a tertiary healthcare center. Study included 50 Hypertensive and 50 normal healthy control subjects. Lipid profile was estimated in both groups. Our study shows that TC-Total cholesterol, TGs-Triglycerides, LDL- Low density lipoprotein, VLDL-Very low density lipoprotein was higher in Hypertensive subjects as compared to normal control subjects and this difference was statistically highly significant. HDL-High density lipoprotein was low in Hypertensive subjects as compared to normal control subjects and this difference was statistically highly significant. Dyslipidemia and hypertension in combination increases the risk of cardiovascular diseases, stroke etc. Hence early detection of dyslipidemia in hypertensive patients and aggressive treatment of both the conditions should be carried out to prevent complications.

**Key words** : Hypertension, Lipid Profile.

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**Introduction**

Hypertension is the most common of the cardiovascular diseases which is the leading cause of morbidity and mortality in the industrial world as well as becoming an increasing common disease in the developing countries [1]. Hypertension is defined as SBP level higher than 140 mmHg and DBP higher than 90mmHg. Hypertension is characterized by abnormality of cardiac output systemic vascular resistance and arterial compliance. Approximately 25% of adult populations are affected.[2] Hypertension is one of the ten leading reported causes of death and about 4% deaths were due to hypertensive complication.[3] Untreated hypertension is notorious for increasing the risk of immortality and is often described as a silent killer. Mild to moderate hypertension, if left untreated, is associated with a risk of atherosclerotic disease in 30% of people and organ damage in 50% of people after only 8-10 years of onset[4]. The most important risk factors for the development of hypertension are increased salt intake, obesity, cigarette smoking, lack of physical exercise, genetic factors and stress and strain[5,6] Hypertension and dyslipidemia are major risk

factors for cardiovascular disease (CVD) and account for more than 80% of deaths and disability in low- and middle income countries.[7,8] The prevalence of hypertension is projected to increase globally, especially in the developing countries.2 In recent years, rapid urbanization, increased life expectancy, unhealthy diet, and lifestyle changes have led to an increased rate of CVD in Southeast Asia.[9] It is widely accepted that CVD is associated with hypertension and increased blood levels of low-density lipoprotein (LDL), total cholesterol (TC), and triglycerides (TG). In contrast, a low level of high density lipoprotein (HDL) is a risk factor for mortality from CVD.[10] The objective of this study was to examine the serum lipid patterns of newly diagnosed hypertensive patients attending a tertiary healthcare center

**Material and Methods**

This prospective study was conducted in Department Of General Medicine in Tertiary care hospital. The selected subjects were grouped as: Healthy control subjects (n=50). It was ensured by routine examination that all the subjects were

healthy and there were no signs and symptoms of hypertensive and other disease. Hypertensive subjects (n=50), It included the clinically established patients of hypertension. Their blood pressure is in range of systolic blood pressure (>140 mmHg) and diastolic blood pressure (>90mmHg) and have no symptoms of diabetes mellitus. An informed consent was taken from all the healthy control subjects and patients, under study apprising them the nature and objective of the study. All subjects were studied as outpatient. Participant's examination included interviews for medical and nutritional history. Present and past history of each case was recorded in detail regarding their general information i.e. name, age, sex, address, occupation, economic status, nutritional and personal habits, education, medication and history suggestive of any systemic illness. Each subject was then examined for various anthropometric parameters: Weight (Kg), height

(meters), BMI (Body Mass Index) was calculated by Weight (Kg) / height squared (m<sup>2</sup>) and Blood pressure (BP). After an overnight fast of 10-12 hours, fasting blood samples were collected. Blood samples were drawn from antecubital vein of each subject by using aseptic technique. The blood was collected in plain tubes for lipid parameters respectively. Serum was separated after centrifugation and analysed. Following biochemical parameters were analysed, TC-Total cholesterol, TGs-Triglycerides, HDL-High density lipoprotein, LDL-Low density lipoprotein, VLDL-Very low density lipoprotein. Statistical analysis was carried out by statistical package of social sciences (SPSS). Mean and standard deviation were computed for all continuous variables and comparison was done using Student's t-test. p value was calculated. p<0.05 was considered significant and p<0.001 was considered highly significant.

## Results

**Table 1: Age and BMI of subjects.**

| Age and BMI of subjects. | Hypertensive n=50 Mean±SD | Control n=50 Mean±SD |
|--------------------------|---------------------------|----------------------|
| Age (Years)              | 52.8±6.2                  | 46.8±11.4            |
| BMI(KG/m <sup>2</sup> )  | 25.98±3.2                 | 22.6±2.4             |

**Table 2: Gender of Subjects**

| Gender | Hypertensive n=50 | Control n=50 |
|--------|-------------------|--------------|
| Male   | 28                | 26           |
| Female | 22                | 24           |

**Table 3: Blood pressure of Subjects**

| Blood Pressure      | Hypertensive n=50 Mean±SD | Control n=50 Mean±SD |
|---------------------|---------------------------|----------------------|
| Systolic BP (mmHg)  | 154.6±10.2                | 116.2±4.8            |
| Diastolic BP (mmHg) | 94.8±8.1                  | 73.4±6.2             |

**Table 4: Lipid Profile in Subjects**

| Lipid Profile | Hypertensive n=50 Mean±SD | Control n=50 Mean±SD | p value |
|---------------|---------------------------|----------------------|---------|
| T.C(mg/dl)    | 190.4±34.24               | 140.8±32.16          | <0.001  |
| TGs(mg/dl)    | 142.6±60.8                | 106.8±36.42          | <0.001  |
| HDL (mg/dl)   | 42.78±2.8                 | 48.6±3.8             | <0.001  |
| LDL (mg/dl)   | 112.2±36.87               | 102.8±26.34          | <0.001  |
| VLDL (mg/dl)  | 27.8±12.34                | 21.6±8.24            | <0.001  |

TC-Total cholesterol, TGs-Triglycerides, HDL-High density lipoprotein, LDL-Low density lipoprotein, VLDL-Very low density lipoprotein. P<0.001 – Highly Significant

Table 4 shows that TC-Total cholesterol, TGs-Triglycerides, LDL-Low density lipoprotein, VLDL-Very low density lipoprotein was higher in Hypertensive subjects as compared to normal control subjects and this difference was statistically highly significant. HDL-High density lipoprotein was low in Hypertensive subjects as compared to normal control subjects and this difference was statistically highly significant.

## Discussion

This study provides evidence that baseline levels of lipids, particularly total cholesterol and HDL, are associated with increased levels of arterial hypertension, expressed by higher values of BP. Though there is a lot of research over this topic, the precise biological mechanism by which lipids may give rise to elevations in BP still present some evidence gaps. Genetic and cross-sectional studies suggested a connection between dyslipidemia and hypertension. Hypertensive individuals have a higher prevalence of dyslipidemia and 12% of subjects with early-onset hypertension have an increased frequency of lipid disorders [11,12]. At

first, smooth muscle cell hypertrophy and collagen deposition come as a consequence to high cholesterol levels leading to arterial stiffness translated to elevated systolic BP. In addition, dyslipidemia leads to endothelial dysfunction and improper vasoregulation, as nitric oxide production release and subsequent activity being reduced among those with high total cholesterol and low HDL-C levels. Dyslipidemia has been associated with increased circulating levels of endothelin-1 [14] which in turn has been linked with hypertension. In addition, dyslipidemia may cause damage to the renal microvasculature with the downstream effect of hypertension [13]. Our study shows that TC-Total cholesterol, TGs-Triglycerides, LDL-Low density lipoprotein, VLDL-Very low density lipoprotein was higher in Hypertensive subjects as compared to normal control subjects and this difference was statistically highly significant. HDL-High density lipoprotein was low in Hypertensive subjects as compared to normal control subjects and this difference was statistically highly significant. In our study, serum TC concentrations are significantly higher in hypertensive patients than in normotensive subjects. This is consistent with earlier observations in parts of the world and in other parts of Nigeria. High levels of serum cholesterol are known to increase the risk of developing macrovascular complications such as coronary heart disease (CHD) and stroke. [15] Many epidemiological studies indicate a progressive increase in CHD risk as the serum TC exceeds 5.0 mmol/L which prompted Lewis [16] to suggest that levels of serum TC in the range 5.0–6.5 mmol/L to be considered undesirable. It is to be noted that there was positive and significant correlation between serum TC and both systolic and diastolic BP in both hypertensive patients and normotensive controls. Hypertension and dyslipidemia are well known to frequently coexist. The coexistence of hypertension and dyslipidemia has multidimensional clinical implications. First, CVD risk is synergistically enhanced and for this reason, both conditions should be treated aggressively. This association has been linked to background central obesity and consequent insulin resistance which are underlying factors that play major roles in the pathogenesis of both hypertension and dyslipidemia. The results of a 7 year follow-up study on Finnish men suggested that dyslipidemia characteristic of the metabolic syndrome predicted the development of hypertension. [17] Halperin et al. [18] had also shown that dyslipidemia in apparently healthy individual's leads to hypertension. Hausmann et al. [19] The present study found that the mean  $\pm$  SD of the total cholesterol, LDL, and triglycerides were significantly higher in hypertensive patients compared to control group. The mean HDL was

lower among cases than controls. Similar findings were observed in following studies, Pyadala N et al[20], T.V. Murali Krishna et al[21] Kavindra Borgaonkar et al.[22] The coexistence of hypertension and dyslipidemia has multidimensional clinical implications. CVD risk is synergistically enhanced and for this reason, both conditions should be treated aggressively.

### Conclusion

This study concludes that dyslipidemia is associated with the hypertensive people. Though the cause and effect relationship is not known, increased blood pressure may create disturbances in lipid metabolism, early preventive strategies like life style changes (e.g. healthy diet, regular exercise, maintaining ideal body weight, absolute avoidance of smoking, alcohol), proper medications, (keeping in mind antihypertensive drugs are known to cause dyslipidemia) are very essential. The results of this study demonstrate that patients with hypertension are more likely than normotensive patients to exhibit dyslipidemia, including elevated TC, LDL, TG, and reduced HDL cholesterol levels. Our results suggest that elevated BP may predict certain disturbances in lipoprotein metabolism

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