



## COMPARATIVE STUDY OF SERUM LIPID PROFILE AND BLOOD GLUCOSE LEVEL BETWEEN ESSENTIAL HYPERTENSIVE AND NORMOTENSIVE

### Biochemistry

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### ABSTRACT

**Background:** Essential Hypertension is a major health problem in developed as well as in developing countries. It is one of the most important public health challenges worldwide because of its high frequency and concomitant risks of cardiovascular and kidney disease. Hypertension and dyslipidemia are major risk factors for coronary artery disease (CAD) and account for >80% of death and disability in the low- and middle-income countries. Blood glucose levels in hypertensive cases were also included to find out the association of hyperglycemia with hypertension.

**Objective:** The present study we try to study the role of lipid profile, and blood glucose in hypertension individuals.

**Materials and methods:** The present study was carried out in the Department of Biochemistry on 100 subjects in the age group of 30-70 years, attended OP in Rama Medical College & Hospital, Kanpur. Among them 50 healthy subjects enrolled as control group remaining 50 Essential hypertension [EH] patients were served as case group. Lipid profile and RBS level were estimated by ERBA Auto analyzer.

**Results:** The study showed that TG, Total cholesterol, LDL-C, VLDL-C and blood glucose levels were raised in patients with hypertension in comparison to controls. HDL-C levels were decreased in patients with hypertension in comparison to controls. There was negative correlation between cholesterol and HDL-C levels in cases where as a positive correlation was seen between cholesterol and LDL-C levels.

**Conclusions:** Based on the obtained results the serum lipid profile and random blood glucose may be useful in identification of patients at risk of hypertension. Measuring TG, Total cholesterol, LDL-C, HDL, VLDL-C and blood glucose levels is a useful test as it carries important prognostic information.

### KEYWORDS

Cholesterol, Cardiovascular Diseases, Lipids, Hypertension, Triglycerides, Dyslipidemia.

### INTRODUCTION:

Blood pressure is the force that drives blood through blood vessels to supply oxygen and nutrients to the body's organs and tissues and carry away metabolites and waste materials [1]. Blood pressure is optimal if the systolic blood pressure (SBP) is lower than 120mmHg and diastolic blood pressure (DBP) is less than 80mm Hg. Hypertension is one of the most common diseases treated by physicians. It is a common health problem worldwide and with ongoing global increase in the incidence [2]. Hypertension is defined as a systolic BP  $\geq$  140 mm Hg and or diastolic BP  $\geq$  90 mm Hg [3]. Essential hypertension is a complex multifaceted disorder, which may include other abnormalities including dyslipidemia, central obesity, glucose intolerance and hyperinsulinemia [4].

Cardiovascular diseases are increasing worldwide [5]. This increase is causing a major concern in developing countries like India. Hypertension and dyslipidemia are the two major contributing risk factors for heart diseases. They co-exist in the range of 15 to 31%. Both the risk factors have an adverse impact on the vascular endothelium, which results in enhanced atherosclerosis leading to CVD [5]. Dyslipidemia is a major modifiable cardiovascular disease (CVD) risk factors [6]. It has also been identified as independent risk factors for essential hypertension [7,8]. Dyslipidemia is more common in hypertensive patients that have not been treated [9,10]. According to estimates by the WHO 2001, coronary vascular disease (CVD) accounts for 29% of all deaths and 11% of disease burden in the South-East Asia [11]. Epidemiological studies have established a strong association between hypertension and CVD [12]. The prevalence of hypertension is projected to increase globally, especially in the developing countries [13]. In recent years, rapid urbanization, increased life expectancy, unhealthy diet, and lifestyle changes have led to an increased rate of CVD in Southeast Asia, including India [14].

This prompted the present study of lipid profile in hypertension patients. The study included the estimation Blood glucose levels in hypertensive cases are also included to find out the association of hyperglycemia with hypertension. The reasons for increased rate of hypertension include life style changes, sugar rich diet, high fat processed foods and sedentary behavior (Kearney *et al.*, 2005).

The goal of this study is to find out possible correlation between lipid profile and Essential hypertension. Mainly in this study we have tried

to correlate lipid profile with Random Blood sugar (RBS) level in healthy and Essential Hypertension patients.

### MATERIALS AND METHODS:

Present study was conducted on 100 subjects aged between 30-70 years attended OP in Rama medical college, Kanpur, U.P. These 100 subjects were divided into following groups.

**Group-A** contains 50 subjects suffering with Essential Hypertension (not more than 3 year).

**Group-B** contains 50 healthy subjects (without Essential Hypertension)

All the subjects were informed and constant letter was taken.

**Inclusion criteria:** Recently diagnosed [below 3 months] hypertensive patients

### Exclusion criteria:

- i) Hypertension > 1 year of duration
- ii) Secondary hypertension
- iii) Diabetes mellitus, congestive heart failure, history of any atherosclerotic disease, urinary tract infection, any intercurrent illness, strenuous exercise and menstruation to rule out any proteinuria due to other causes. All the subjects were informed and consent letter was taken.

### Biochemical analysis:

Using aseptic precautions 3 ml of venous blood was collected from antecubital vein in Fasting condition. Samples were centrifuged after 30 minutes; serum was isolated and used for the measurement of Lipid profile and RBS by following method (by ERBA Auto analyzer).

**Serum Total Cholesterol:** CHOD-PAP Method

**Triglycerides:** Enzymatic Method

**HDL:** Precipitation method

**LDL:** Total cholesterol-(HDL-C+VLDL-C)

**VLDL:** VLDL-C (mg/dl) = triglycerides/5

**Blood Glucose:** Glucose Oxidase and Peroxidase Method

### STATISTICAL ANALYSES:

All the values were expressed as Mean  $\pm$  SD. The statistical analysis

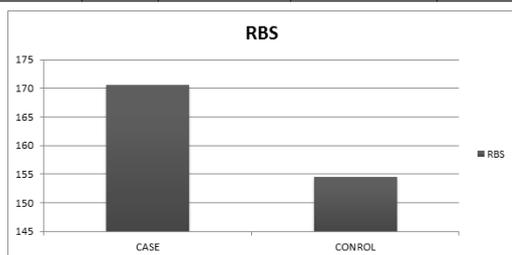
was done using student 't' test and Pearson's correlations for comparison between two groups and a p-value of <0.05 was considered statistically significant.

**RESULT:**

The present study conducted on 100 subjects among them 50 people suffering with Essential hypertension was chosen as control (group-A) and 50 age and sex matched healthy subjects were served as case group (group-B). Measurement of blood pressure, lipid profile, fasting blood glucose and were done in both the groups. The result of the study is given below.

**Table-1: showing baseline characteristics with mean and SD (Blood pressure and RBS)**

GROUP STATUS		SBP (mmHg)	DBP (mmHg)	RBS (mg/dl)
Case (50)	MEAN	155.70	83.64	170.59
	SD	14.12	16.55	25.97
Control (50)	MEAN	116.66	70.40	154.58
	SD	6.85	0.55	22.32



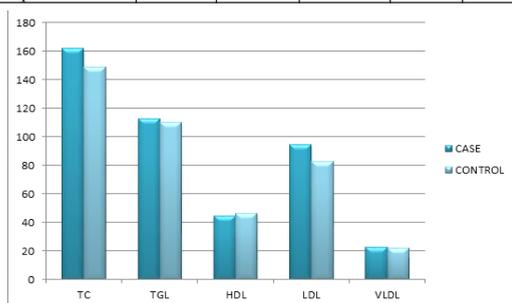
**GRAPH-1: Comparison of RBS**

The blood pressure is calculated separately as systolic blood pressure and diastolic blood pressure. The mean SBP of the hypertensive subjects is 155.70±14.12 mmHg and that of the controls is 116.66±6.85mmHg. The mean of the SBP is higher in hypertensives subjects than controls (p<0.001). The mean DBP of hypertensive cases is 83.64±16.55 mmHg and that of the controls is 70.40±0.55 mmHg. The mean of cases is higher than controls (p<0.05).

The mean random blood glucose of hypertensive subjects is 170.59±25.97 mg/dl. The mean random blood glucose of controls is 154.58±22.32 mg/dl. The mean of hypertensive subjects is higher than controls (p<0.05).(Table-1)

**Table-2: showing baseline characteristics with mean and SD (Lipid Profile)**

GROUP STATUS		TC (mg/dl)	TGL (mg/dl)	HDL (mg/dl)	LDL (mg/dl)	VLDL (mg/dl)
Case (50)	Mean	161.92	112.84	44.70	94.76	22.57
	SD	35.24	39.09	10.41	35.19	7.82
Control (50)	Mean	149.20	110.38	46.64	82.48	22.08
	SD	28.15	25.15	7.48	28.73	5.03
p-value		<0.001	<0.001	>0.05	<0.001	<0.001



**GRAPH-1: Comparison of Lipid Profile**

The mean total cholesterol in hypertensive cases is 161.92±35.24 mg/dl. The mean total cholesterol of controls is 149.20±28.15 mg/dl. The mean of hypertensive cases is higher than controls (p<0.001). The mean TGL of hypertensive subjects is 112.84±39.09 mg/dl and that of controls is 110.38±25.15 mg/dl. The mean TGL of cases is higher than controls (p<0.001).The mean HDL of hypertensive cases is 44.70±10.41 mg/dl and that of controls is 46.94±7.48 mg/dl. The

increase in mean of HDL in controls than cases is not statistically significant (p>0.05). The mean LDL of hypertensive cases is 94.76±35.19 mg/dl. The mean LDL of controls is 82.48±28.73 mg/dl. The mean LDL of cases is higher than controls (p<0.001). The mean VLDL of hypertensive subjects is 22.57±7.82 mg/dl. The mean VLDL of controls is 22.08±5.03 mg/dl. The mean VLDL of cases is higher than controls (p<0.001)(Table-2).

**DISCUSSIONS**

In this study, serum TC, TG, and LDL-L concentrations are significantly higher in hypertensive patients than innormotensive subjects. High levels of serum cholesterol are known to increase the risk of developing macrovascular complications such as coronary heart disease (CHD) and stroke. More than 80% of people with hypertension have additional comorbidities, such as obesity, glucose intolerance, hyperinsulinemia, reduced HDL cholesterol, elevated LDL cholesterol, elevated triglycerides etc. More than 50% of people with hypertension have two or more comorbidities. The present study is done to study the pattern of lipid profile in hypertensive patients compared to the controls. In the present study, we also Random fasting blood sugar to check whether there is any significance in cases compared to controls. 100 cases were studied including 50 hypertensive cases and 50 controls. The blood pressures of the two groups were recorded. Blood samples were taken for the estimation of blood glucose, lipid profile.

Castilli W.P, Anderson K.A (1986) had supported that blood pressure and serum cholesterolare correlated with 'r' factor of 0.12 suggesting that those with higher blood pressure values tendto have higher serum cholesterol in Framingham heart study. Coronary heart disease developedwith great consistency in patients with a ratio of total cholesterol to HDL-C of more than 4.5.Half of the women and more than half of the men who presented with hypertension were alreadyhaving abnormal lipid profile.3

Mannimen V, et al (1992) in the Helsinki heart study and Misra K.P. et al (1980) found that LDL-C/HDL-C ration, had more prognostic value than LDL-C and HDL-C alone and hypertriglyceridemia was a strong indicator of short term CAD risk especially when LDL-C / HDL-C ratio was also high.7

The Framingham study revealed that HDL-C level was a major potent lipid risk factor having aninverse association with the incidence of CHD both in men and women; the proposed hypothesisisthat HDL facilitates the uptake of cholesterol form peripheral tissue and helps in its transport toliver for degradation and excretion. However lower the HDL level, higher the LDL levels andTC/HDL ratio are more predictive of coronary heart disease8.

**CONCLUSION**

The systolic blood pressure was more significant than the diastolic blood pressure with increasing age groups. Elevated levels of cholesterol, LDL, VLDL, triglycerides are observed and no significance in HDL. Random blood glucose is statically significant in hypertensive cases when compared to controls but the significance may be due to the presence of 12% diabetic cases among the hypertensive patients. From the above study that dyslipidemia is associated with hypertension is associated with hypertension this is may due to the genetic predisposition, secondary life styles, fatty food consumption, saturated fat, cholesterol in the food increase the blood cholesterol and saturated fat is the main culprit, Smoking and increased alcohol intake.

This study has shown that lipid and blood sugar abnormalities are highly prevalent among hypertensive patients. The treatment of hypertension should include correction of dyslipidemia, hyperglycemia and other risk factors also.

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