

A Study of Lipid Profile in Hypertensive Subjects

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Abstract: Introduction- Dyslipidemia, which is associated with hypertension, has been recognized as independent risk factor for cardiovascular disease, a leading diagnosis for visits to physicians and cause of death. Age and gender differences also affect serum lipids considerably. Hypertensive subjects frequently have higher cholesterol levels than normotensive subjects. Though no specific pattern of dyslipidemia has been consistently reported among hypertensive individuals, many studies have shown that total cholesterol (TC), triglycerides (TG), and virtually all fractions of lipoproteins tend to be more frequently abnormal among hypertensive patients than in the general population. Aims and Objectives-To assess the correlation between hypertension and various parameters of Dyslipidemia.

Materials and Methods-Patient attending Medicine OPD and admitted in department of medicine in Subharti medical college were subjected for study from the period of October 2015 to September 2017. The study comprised of a minimum of 100 patients of essential hypertension called as study group and 50 controls. The cases and controls were selected after applying the inclusion and exclusion criteria. Informed consent was taken from the patients or their relatives after explaining the nature of study and risks involved in participation of study. The clinical and demographic profile at the time of admission to medicine ward including age, sex, occupation were recorded for all the study subjects.

Results: Conclusion-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. This association will help to develop future strategies for preventing both hypertension and dyslipidemia through proper lifestyle changes or medical management or by the combination of both.

Keywords- Dyslipidemia, TC, LDL, TG, HDL, Hypertension

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I. Introduction

Dyslipidemia include disorders of Lipoprotein metabolism and is characterized clinically by increased plasma levels of cholesterol, triglyceride or both, variably accompanied by decrease high density lipoprotein cholesterol.

Abnormalities in serum lipid (dyslipidemia) are recognized as major modifiable cardiovascular disease (CVD) risk factors^[1] and have been identified as independent risk factors for essential hypertension giving rise to the term dyslipidemic hypertension^[2, 3].

Dyslipidemia is more common in untreated hypertensives than normotensives, and lipid levels increase as BP increases^[4, 5].

Though no specific pattern of dyslipidemia has been consistently reported among hypertensive individuals, many studies have shown that total cholesterol (TC), triglycerides (TG), and virtually all fractions of lipoproteins tend to be more frequently abnormal among hypertensive patients than in the general population.

Hypertension is a powerful risk factor for cardiovascular disease and it remains one of the biggest health and economic issues facing the world^[6,7]. Hypertension is known to be associated with alterations in lipid metabolism which gives rise to abnormalities in serum lipid and lipoprotein levels. It has also been documented that presence of hyperlipidemia substantially worsens the prognosis in hypertensive patients^[8]. The frequent clustering of hypertension, lipid abnormalities, and other metabolic abnormalities, in an individual has been clearly demonstrated to be synergistic in accelerating atherosclerosis and development of CVD^[9].

With the current trend of increasing incidence and prevalence of hypertension, CVD, and other non-communicable diseases coupled with the persistence of high rates of communicable diseases in most developing countries, these countries have been said to be experiencing a “double burden of disease.”

Hypertension which is defined as blood pressure of equal to or greater than 140/90mmHg^[10] has been recognized as the most common cardiovascular disorder^[11] and a leading cause of morbidity and mortality in both developed and developing countries^[12]. Hypertension has been recognized as one of ten (10) leading reported causes of death with about 4% of such deaths due to hypertensive complications^[13]. Essential hypertension has been appropriately called the silent killer because it is usually asymptomatic and undetected. Uncontrolled hypertension can cause damage to all organs of body.^[14]

Dyslipidaemia and hypertension are the commonest risk factors for coronary artery disease (CAD).^[15] Recent reports show that Stage I hypertension carry a significant cardiovascular risk^[16].

The reported prevalence of hypertension varies around the world, with the lowest prevalence in rural India (3.4% in men and 6.8% in women) and highest in Poland (68.9% in men and 72.5% in women)^[17].

Dyslipidemia, which is associated with hypertension, has been recognized as independent risk factor for cardiovascular disease, a leading diagnosis for visits to physicians^[18] and cause of death^[19]. Age and gender differences also affect serum lipids considerably^[20,21]. Hypertensive subjects frequently have higher cholesterol levels than normotensive subjects. Isolated systolic hypertension (systolic B.P >140mm of mercury and diastolic <90 mm of mercury) commonly seen in elderly subjects can be attributed to atherosclerosis induced stiffening of aorta and major arteries^[22].

Atherosclerosis is more extensive and severe in hypertensive persons than in normotensive, was the conclusion after the autopsy studies conducted on human coronary arteries and aortas collected from various parts of the world^[23]. Atheromas appear earlier and most abundant in the high-pressure segments of the circulation^[24]. So during work up of hypertensive patients it is worthwhile to investigate for all risk factors of CAD, especially lipid profile^[25].

II. Materials And Methods:

Aims and objectives

1) To study the plasma lipid profile in hypertensive patients.

2) To assess the correlation between hypertension and various parameters of Dyslipidemia.

The present study was conducted in the department of Medicine, CSS Hospital, Subharti Medical College on 100 hypertensive and 50 normal subjects.

Patient attending Medicine OPD and/or admitted in department of medicine in Subharti medical college and associated hospitals were subjected for study from the period of October 2015 to September 2017. The study comprised of 100 patients of essential hypertension called as study group and 50 age and sex matched cases called as controls.

Blood Pressure was measured as follows : At least two measurements were taken in sitting position in right arm. The centre of cuff was at the level of heart and width of the bladder cuff was of standard size. The length of the cuff bladder encircled at least 80% of the arm circumference. The rate of deflation of cuff was 2mm of Hg per second. Systolic Blood Pressure was the first of atlas two regular tapping Korotkoff sounds, and diastolic Blood Pressure was the point at which the last Korotkoff sound was heard. At least 50 subjects of different age groups and either sex with normal reference of weight according to height without any history of hypertension. Individuals with any of these factors were excluded : Smoking, Alcoholism, Obesity, Diabetes, Hypothyroidism, Chronic Kidney Disease, Chronic Liver Disease. Patients diagnosed as cases of essential hypertension based on history were included. The cases and controls were selected after applying the inclusion and exclusion criteria. Informed consent was taken from the patients or their relatives after explaining the nature of study and risks involved in participation of study. The clinical and demographic profile at the time of admission to medicine ward including age, sex, occupation were recorded for all the study subjects. A careful and detailed history was recorded rule out smoking and alcoholism . A detailed general physical examination was done .The results obtained were subjected to standard statistical methods for analysis and relevant conclusions were drawn from them. All the data was analyzed using computer based software. Descriptive statistics were used to investigate the general characteristics of patients. Measurements of central tendency including mean and standard deviation were used to ascertain the data regarding the different laboratory parameters. The correlation between hypertension and lipid profile was assessed. A p value less than 0.05 was considered to be statistically significant throughout the study.

III. Results And Discussion:

This was a case control hospital based study. In our study a total of 150 subjects were analyzed out of which 100 were cases and 50 were controls and were age and sex matched. Patients attending Medicine OPD and/or admitted in department of medicine in Subharti medical college were subjected for study from the period of October 2015 to September 2017.

In this study, serum TC, TG, LDL and VLDL concentrations were significantly higher in hypertensive patients than in normotensive subjects.

AGE RANGE	NO.OF CASES	% OF CASES	NO. OF CONTROLS	% OF CONTROLS
30-39	17	17	9	18
40-49	32	32	23	46
50-59	34	34	15	30
60-69	11	11	3	6
70-79	4	4	0	0
80-89	2	2	0	0
Grand Total	100	100	50	100

Table 1 shows the majority of the study population comprised of age group 50-59 years accounting for 34% of cases. Only 2% of cases between 80-89 years.

Table 2 GENDER

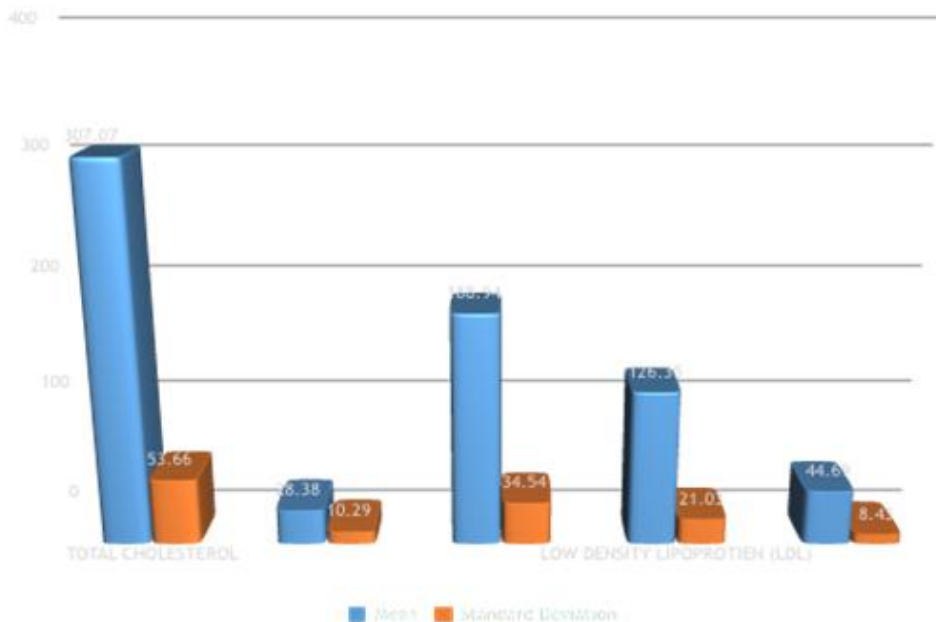
	NO.OF CASES	% OF CASES	NO. OF CONTROLS	% OF CONTROLS
Male	67	67	38	76
Female	33	33	12	24
Grand Total	100	100	50	100

Table 2 shows the sex distribution of study population.33% of the cases comprised of females and remaining 67% of cases comprised of males.

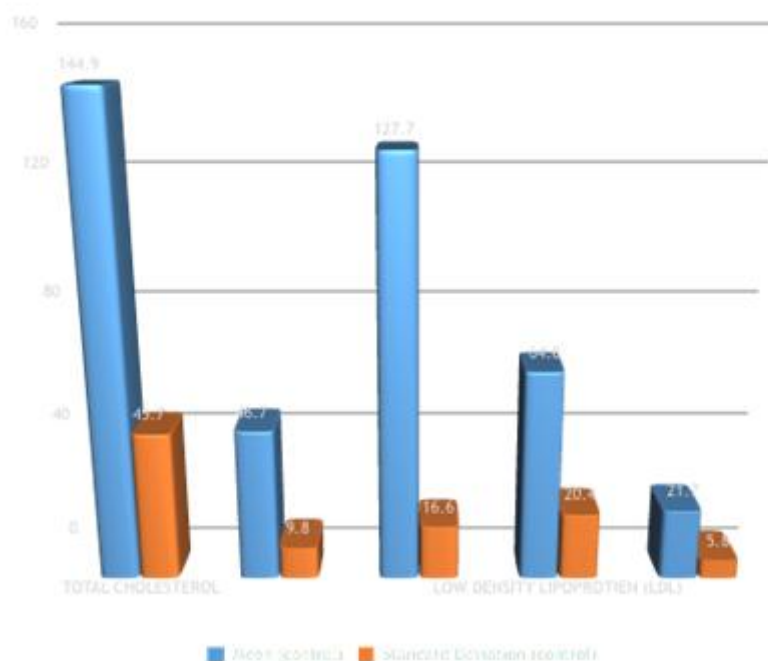
Table 3-Total mean and standard deviation of lipid profile in this study.

LIPID PROFILE	Mean± Standard Deviation(cases)	Mean ± Standard Deviation (control)
TOTAL CHOLESTEROL	307.07±53.66	144.9±45.7
HIGH DENSITY LIPOPROTEIN (HDL)	28.38±10.29	46.7±9.8
TRIGLYCERIDES (TG)	188.94±34.54	127.7±16.6
LOW DENSITY LIPOPROTEIN (LDL)	126.35±21.03	64.8 ±20.4
VERY LOW DENSITY LIPOPROTEIN (VLDL)	44.69±8.43	21.7±5.8
NON- HIGH DENSITY LIPOPROTEIN (HDL)	278.69±63.95	98.2±55.5

Total mean and standard deviation (Cases)



Total mean and standard deviation (Controls)



In this study, serum TC, TG, LDL and VLDL concentrations were significantly higher in hypertensive patients than in normotensive subjects. This was consistent with the earlier observations in the study conducted by Akuyam et al.^[26] however this was unlike the findings of Akintunde et al.^[27], Lepira et al.^[28] who reported that the TC, TG, and LDL-C of newly diagnosed hypertensive patients did not differ significantly from that of control subjects, though the newly diagnosed hypertensive tended to have a higher level of LDL-C, TG, TC. Isolated high TC was the most common individual lipid abnormality among the Cases. Isolated low HDL-C was the most common individual lipid abnormality among the control subjects among whom it represented 16% of all forms of dyslipidaemia. Odenigbo et al.^[29] reported a high rate of low HDL-C among apparently healthy professionals in Asaba. Sabri et al.^[30] and Yin et al.^[31] showed that the total cholesterol level was higher in hypertensive patients than non-hypertensive subjects which was similar to observations made in our study in which 100% of total hypertensive subjects had elevated levels of total cholesterol as compared to 8% of normotensive subjects. In our study 93% of cases had higher levels of triglycerides as compared to 1% of controls which was similar to study conducted in 2008, by Li et al.^[32] which revealed higher triglyceride levels in hypertensive patients in China. Serum total cholesterol values were statistically significant higher ($p < 0.001$) in hypertensive subjects (307.01 ± 53.66 mg/dL) as compared to the healthy control subjects (144.9 ± 45.7 mg/dL). Kumar et al.^[33] also reported a statistically highly significant relation ($p < 0.001$) in serum total cholesterol level in hypertensive subjects (209 ± 31.63 mg/dL) as compared to the healthy controls (172.8 ± 13.43 mg/dL). Mean serum TG values were statistically significant higher ($p < 0.001$) in hypertensive subjects (188.94 ± 34.54 mg/dL) as compared to the healthy control subjects (127.7 ± 16.6 mg/dL). Mean serum HDL-C values were statistically significant higher ($p < 0.001$) in hypertensive subjects (28.38 ± 10.29 mg/dL) as compared to the healthy control subject (46.7 ± 9.8 mg/dL). Our observation were in accordance with those of Saha MS et al.^[34] who reported a highly significant relation ($p < 0.001$) with serum HDL-c in hypertensive subjects (32.91 ± 1.21 mg/dL) as compared to the healthy control subjects (42.88 ± 0.93 mg/dL). In our study, mean serum LDL-C values were statistically significant higher ($p < 0.001$) in hypertensive subjects (126.35 ± 21.03 mg/dL) as compared to the healthy control subjects (64.8 ± 20.4 mg/dL). In accordance to our study, Saha MS *et al*^[34] reported a highly significant relation ($p < 0.001$) in serum LDL-C in hypertensive subjects (154.32 ± 4.22 mg/dL) as compared to the healthy controls (105.73 ± 3.53 mg/dL).

IV. Conclusion

Dyslipidemia in hypertensive patients is a common entity. The commonest age group of hypertensive patients with dyslipidemia were from 50 - 59 years. Elevated levels of total cholesterol was most significant and elevated levels of LDL was least significant among hypertensive subjects. Elevated levels of HDL cholesterol was most significant and elevated levels of TG was least significant among hypertensive subjects. 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. This association will help to develop future strategies for preventing both hypertension and dyslipidemia through proper lifestyle changes or medical management or by the combination of both. Hypertensive patients need measurement of BP and lipid profile at regular intervals throughout their primary health care to prevent CVD and stroke.

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