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A CORRELATIVE STUDY OF HYPERTENSION WITH LIPID PROFILE

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ABSTRACT

Background: Hypertension is recognized as the most common cardiovascular disorder and a leading cause of morbidity and mortality in both developed and developing countries. Dyslipidaemia (hyperlipidaemia), which is associated with hypertension, has been recognised as an independent risk factor for cardiovascular disease.

Objectives: To assess the plasma lipid profile of hypertensive and normotensive subjects. To assess the association between hypertension and Dyslipidaemia in subjects.

Materials and Methods: The present study was carried out on a total of 100 hypertensive patients attending our tertiary care Hospital and 100 age and sex matched healthy controls. Twelve hour fasting lipid analysis was done for Serum triglycerides (TG), total cholesterol(TC), High Density Lipoprotein (HDL), Low Density Lipoprotein (LDL). Height and weight were measured with the subject in light clothes without shoes, and Body Mass Index (BMI) (Kg/m2) was calculated. Statistical analysis was done by mean, standard deviation, and correlation test.

Results: Maximum incidence of hypertension was noticed in the age group 40-49 years. Male to female ratio was 2.3:1. The hypertensive subjects were significantly ($p < 0.005$) heavier than the normotensive subjects (28.58 ± 4.25kg/m2 vs. 26.79 ± 3.71kg/m2) with significantly higher lipid profile. The triglyceride level was significantly higher in the male than female hypertensive's. Hypertensive subjects has significantly higher BMI as well as lipid profile in the age group of 30-39 years.

Conclusions: A correlation was attempted with various clinical parameters like age, gender and lipid fractions. The serum lipid profile of hypertensive patients were deranged specially in the middle aged group.

KEYWORDS: Hypertension, Dyslipidaemia, BMI, HDL, LDL, Triglycerides

INTRODUCTION

Hypertension which is defined as blood pressure of equal to or greater than 140/90mmHg [1] has been recognized as the most common cardiovascular disorder [2] and a leading cause of morbidity and mortality in both developed and developing countries [3]. Hypertension has been recognized as one of ten (10) leading reported causes of death with about 4% of such deaths due to hypertensive complications [4].

Hypertension is defined as systolic blood pressure (SBP) level higher than 140mmHg and/or a diastolic blood pressure (DBP) higher than 90mmHg. Blood pressure is optimal if the systolic blood pressure (SBP) is lower than 120mmHg and diastolic blood pressure (DBP) is less than 80mm Hg. An elevated arterial blood pressure (chronic hypertension) is a common health problem worldwide and with ongoing global increase in the incidence.

Approximately25% of the adult populations are affected. Although historically defined as “an elevation of blood pressure” alone, hypertension is characterized by abnormalities of cardiac output, systemic vascular resistance, and arterial compliance.

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. [5] Dyslipidaemia and hypertension are the commonest risk factors for coronary artery disease (CAD). [6]

Recent reports show that borderline hypertension (systolic BP 130-139 and/or diastolic BP 85-89 mmHg) and Stage I hypertension carry a significant cardiovascular risk and there is a need to reduce this blood pressure[7]. 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). [8]

It has been found that men have a higher prevalence of hypertension than women although this changes later in life with substantial increase in the number of females with hypertension after the age of 50 years [9].

Dyslipidaemia (hyperlipidaemia), which is associated with hypertension, has been recognised as independent risk factor for cardiovascular disease, a leading diagnosis for visits to physicians [10] and cause of death [11]. Age and gender differences also affect serum lipids considerably. [12,13]

Hypertensive subjects frequently have higher cholesterol levels than normotensive subjects. There are few studies to establish the relationship between hypertension and hyperlipidaemia, but very few studies showing this association from India and there are no such study from central India.

There is also pronounced influence of blood pressure on the rate of atheroma formation in human subjects. Isolated systolic hypertension commonly seen in elderly subjects can be attributed to atherosclerosis induced stiffening of aorta and major arteries. [15] 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. [16] Atheromas appear earlier and most abundant in the high-pressure segments of the circulation. [17] So during work up of hypertensive patients it is worthwhile to investigate for all risk factors of CAD, especially lipid profile. [18] Different plasma lipids vary significantly in various population groups due to difference in geographical, cultural [19], economical, social conditions [20], dietary habits and genetic makeup.

The present study was conducted:-

- To assess the plasma lipid profile of hypertensive and normotensive subjects.
- To assess the association between hypertension and Dyslipidaemia in our population.

METHODS AND MATERIAL

This retrospective study carried out at tertiary care hospital of the Indore city. Clearance from the ethical committee and written consent from all the participants of the study were obtained. A total number of 200 human subjects of age ranging from 30-59 years were included in this study. Out of the 200 subjects, 100 normotensive volunteers (Males and females) were selected as control (group1). The remaining 100 subjects (Males and Females) were grouped as hypertensive (group 2). Height and weight were measured with the subject in light clothes without shoes, and

BMI (Kg/m2) was calculated. Seven millilitres (5ml) venous blood were obtained between 08:00 and 10.00 a.m. after a 12 hour fasting period and dispensed into EDTA bottles.

The samples were centrifuged at 2000g for 5 minutes after which plasma was isolated into a dry plain plastic screw capped containers and refrigerated (at -200C) prior to analyses.

Plasma total cholesterol and triglyceride concentrations were determined by enzymatic colorimetric assay as described previously [14] and modified by Richmond [15] and high density lipoprotein (HDL)-cholesterol and low density lipoprotein (LDL)-cholesterol were determined enzymatically after precipitation of other lipoprotein [16].

Inclusion Criteria

For Study Group

- Subjects who were established case of hypertension taking antihypertensive medicines.
- Newly diagnosed subjects with confirmed hypertension by taking at least two readings of blood pressure first at the time of examinations, and second 15 minutes apart after taking the first reading.
- Age matched with control group.

For Control Group

- Subjects with normal B.P.
- Healthy, age matched with hypertensive group.
- Exclusion criteria for both groups.
- History of any systemic illness.
- History of diabetes mellitus.
- History of any diseases or symptoms or signs having cardiac, vascular or neurological involvement.

STATISTICAL ANALYSIS

The statistical analysis was done using SPSS Software. The results of the study were expressed as mean ± standard deviation (SD). The statistical significance of difference between the various groups was determined by using the student's t-test and a p value of <0.05 and <0.0-1 is considered significant.

RESULTS

There were 70 male patients and 30 female patients. The average age of study groups was 47.21 years. Maximum incidence of hypertension was noticed in the age group 40-49 years. Male to female ratio was 2.3:1.

Table 1: Age and Gender Distribution of the Study Subjects

Age	Male	Female	Total
30-39	17	1	18
40-49	31	15	46
50-59	22	14	36
Total	**70(70%)**	**30(30%)**	**100**

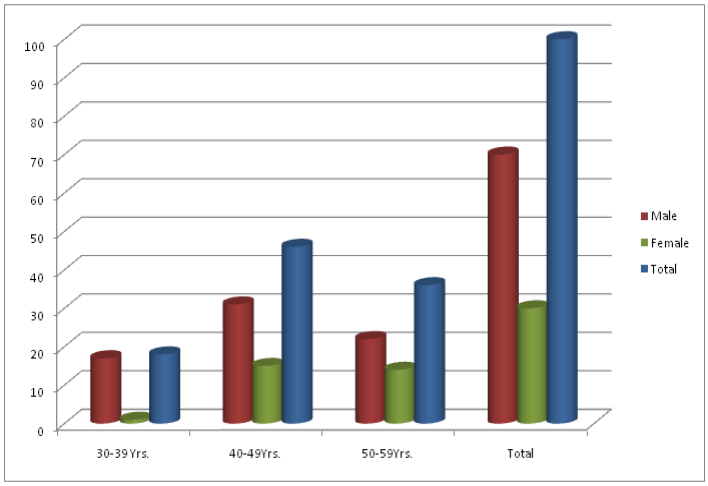

Figure 1: Age and Gender Distribution of the Study Subjects

There were 52 male patients and 48 female patients. The average age of study groups was 40.1 years.

Table 2: Age and Gender Distribution of the Control Group

Age	Male	Female	Total
30-39	16	9	25
40-49	15	35	50
50-59	21	4	25
Total	**52(52%)**	**48(48%)**	**100**

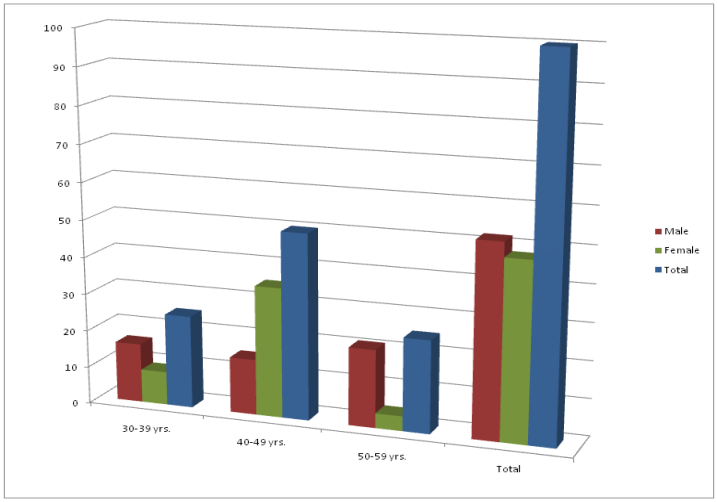

Figure 2: Age and Gender Distribution of the Control Group

Table 2 shows the hypertensive patients were significantly ($p < 0.005$) higher in BMI than the normotensive patients (28.58 ± 4.25kg/m2 vs. 26.79 ± 3.71kg/m2) with significantly higher lipid profile. The mean serum total cholesterol levels were 202.87 ±33.22 and 182.91 ± 37.51 mg/dl and serum triglyceride levels were 164.77 ± 77.06 and 118.2± 54.23 mg/dl in study and control patients respectively.

The results presented in Table 2 also demonstrated that the serum HDL- cholesterol and LDL-cholesterol levels in hypertensive patients were 38.91 ± 8.02 and 132.16 ± 27.83 mg/dl and 39.91 ± 9.06 and 117.8 ± 34 mg/dl respectively, in healthy volunteers.

Table 3: BMI and Lipid Profiles of Hypertensive and Normotensive Patients

	Hypertensive n= 100	Non-Hypertensive n= 100	P-Value
BMI (kg/m2)	28.58 ± 4.25	26.79 ± 3.71	P<0.05
Total Cholesterol (mg/dl)	202.87 ± 33.22	182.91 ± 37.51	P<0.05
Triglyceride (mg/dl)	164.77 ± 77.06	118.2 ± 54.23	P<0.05
HDL- Cholesterol (mg/dl)	38.91 ± 8.02	39.91 ± 9.06	P<0.05
LDL- Cholesterol (mg/dl)	132.16 ± 27.83	117.8 ± 34	P<0.05

Values are mean ± standard deviation (S.D.), S= Significant.

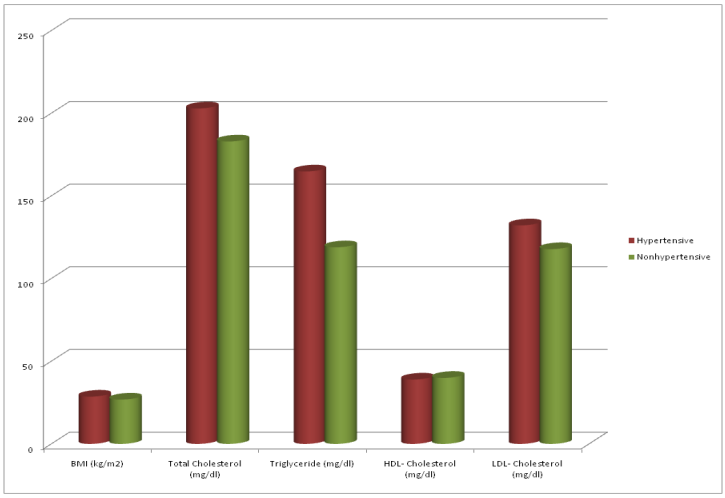

Figure 3: BMI and Lipid Profiles of Hypertensive and Normotensive Patients

Table 3 shows that the triglyceride is significantly higher in the male than female hypertensive patients.

Table 4: Gender Related Comparison of BMI and Lipid Profile in Hypertensive

	Male n= 70	Female n=30	r
BMI (kg/m2)	28.16 ± 2.63	29.57 ± 5.38	1.52
Total Cholesterol (mg/dl)	203.31 ± 31.24	201.83 ± 37.94	0.20
Triglyceride (mg/dl)	173.97 ± 80.22	143.3 ± 65.43	2.03*
HDL- Cholesterol (mg/dl)	38.17 ± 8.10	40.63 ± 7.67	1.41
LDL- Cholesterol (mg/dl)	132.7 ± 27.01	130.89 ± 30.08	

*Significant at p<0.05 level

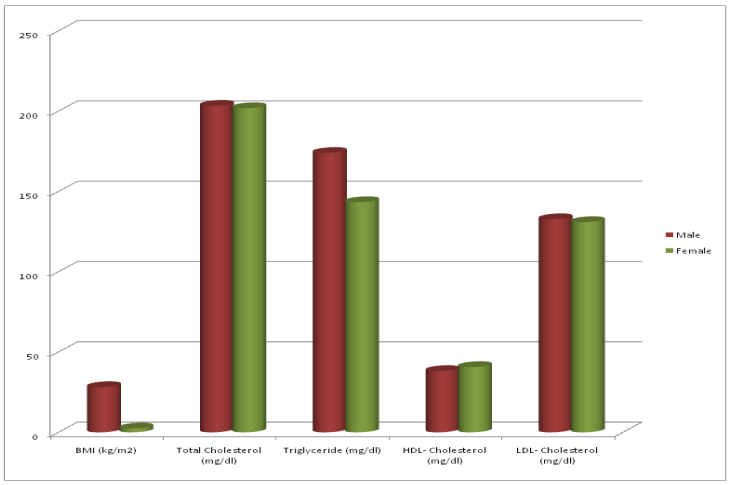

Figure 4: Gender Related Comparison of BMI and Lipid Profile in Hypertensive

The study shows that Total Cholesterol is significantly higher in 50-59 years of age. Triglyceride shows significantly higher in 30-39 years. HDL Cholesterol has no significant correlation with Hypertension.

Table 5: Mean Lipid Level Variations – Age Related

Variables	Hypertensive			Normotensive			r
	Mean	Sd.	N	Mean	Sd.	N	
BMI							
30-39	28.40	3.10	18	25.56	3.07	35	3.18*
40-49	28.99	4.83	46	26.81	4.41	40	2.17*
50-59	28.16	4.01	36	28.70	2.41	25	0.60**
Total Cholesterol							
30-39	205.44	32.50	18	182.62	37.98	35	2.16*
40-49	197.58	29.16	46	187.62	35.01	40	1.43**
50-59	208.33	38	36	172.04	39.2	25	3.61*
Triglycerides							
30-39	182	88.95	18	111.22	35.69	35	4.13*
40-49	154.04	71.93	46	129.8	74.23	40	1.53**
50-59	169.86	77.27	36	107.96	30.03	25	3.8*
HDL							
30-39	36.46	5.74	18	40.12	5.73	35	2.20*
40-49	38.27	7.33	46	41.75	9.55	40	1.90*
50-59	40.94	9.43	36	38.58	9.25	25	0.96**
LDL							
30-39	132.96	27.49	18	117.42	31.43	35	1.77*
40-49	129.04	26.18	46	119.97	32.80	40	1.42**
50-59	135.82	20.17	36	115.34	40.44	25	2.26*

*Significant at $p<0.05$ level
**Not Significant

DISCUSSIONS

This study has shown that the prevalence of Hypertension is highest in age group 40-49 years of Males and Females. Several studies in both developed and developing countries have consistently shown a positive relationship between age and blood pressure [21,22]. The significantly higher plasma total cholesterol, triglycerides and LDL-cholesterol in the hypertensive than in the normotensive patients in the present study is in corroboration with earlier studies [23,24,25,26].

This study includes only uncomplicated hypertension solely without any target organ damage. The cases with causes of secondary hyperlipidaemia like diabetes mellitus, chronic renal failure, obesity, smoking, alcoholism & drugs were eliminated from the study hence it may vary slightly from the previous reports which have included all these factors. As the study had been carried out in Indore city (Central part of India), where people usually eats oily and fried food, which is high in spices. We had excluded the samples who had history of any systemic illness.

CONCLUSIONS

The serum lipid profile of 200 hypertensive patients were studied and compared with that of healthy controls. A correlation was attempted with various clinical parameters like age, gender and lipid fractions.

The serum lipid profile of hypertensive patients were deranged specially in the middle aged group. Hypertension has been seen higher in males (70%) probably because of irregular eating habits, stressful lifestyle etc.

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