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RESEARCH ARTICLE

Evaluation of Lipid Profile of North Indian Hypertensive Subjects

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ABSTRACT

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**.** The purpose of this study was to compare the blood lipid levels in hypertensive subjects with normotensive subjects by making the association of hypertension with lipid profile in hypertensive cases. This prospective study was carried out in general medicine and pathology departments of Govt. Hospital in Rishikesh. In the present study, the volunteers were selected from General Medicine department of Government hospital Rishikesh from May 2009 to May 2010. Hypertension was defined as per the recommendations of JNC7th Report**.** After 12 hours fast the blood samples were collected from all individuals without anticoagulant and centrifuged at 3000 rpm for 5 minutes. The serum was collected in fresh vial and standard methods were followed for biochemical studies. A total of 120 volunteers were recruited for this study. Out of them 70 were hypertensive subjects (38 males and 32 females) and 50 were normotensive subjects (27 males and 23 females). The results concluded that total cholesterol, LDL- C, VLDL-C and triglycerides were higher and statistically significant in hypertensive subjects than normotensive subjects ($p<0.05$). The mean HDL-C in hypertensive subjects was lower than normotensive subjects and statistically significant ($p< 0.05$).

Keywords: Hypertension, lipid profile, Triglyceride, total cholesterol, cardiovascular diseases.

1. INTRODUCTION

Hypertension is a major health problem worldwide. It is the most common risk factor of CVD which increases the risk of stroke, myocardial infarction, heart and renal failure. According to the world health report of 2003 cardiovascular diseases (CVDs) will be the largest cause of deaths and disability by 2020 in India [1, 2, 3, 4]. In 2020, 2.6 million Indians are predicted to die due to coronary heart disease which constitutes 54.1% of all cardiovascular disease deaths [5]. Dyslipidemia and hypertension are the commonest risk factors for coronary artery disease (CAD) [6]. Persons with combination of these risk factors are particularly at high risk of CAD. Hypertensive persons have usually higher levels of serum lipids than normotensive persons [7]. The changes in serum lipid profile levels should be actively investigated but a few studies have established relation between hypertension and hyperlipidemia [8]. It has been reported several times by animal experiments that lipid induced atherosclerosis can be accelerated if the animals are also made hypertensive, conversely the process is retarded by bringing the arterial pressure back to initial levels [9]. In view of the above consideration, to the best of our knowledge, the present study is the maiden attempt to find out the relationship between serum lipid levels of hypertensive subjects with normotensive subjects in the study area i.e. Rishikesh, Uttarakhand, India.

2. MATERIALS AND METHODS

2.1 Study Area

This prospective study was carried out from May 2009 to May 2010 in Department of General Medicine and Pathology of nearby Govt. Hospital in Rishikesh. The volunteers/subjects were selected from General Medicine

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Department of Government Hospital, Rishikesh, Uttarakhand, India. The volunteers/subjects were informed by the oral communication regarding the aim and objectives of the present study. Both written and verbal consent have been taken from each of the participant before including study.

2.2. Ethical issues

Ethical clearance was obtained from the management of Govt. Hospital, Rishikesh (U.K), India. Consent forms were given and duly filled by the volunteers/subjects to seek their permission before been sampled and only volunteers/subjects that agreed by signing the forms that were sampled for this study. Information on clinical signs of patients was obtained using verbal interviews and clinical records of volunteers/subjects.

2.3 Case Study

Two groups were included in the study as follows:

Hypertensive Cases: 70 hypertensive volunteer subjects (38 males and 32 females) with the age range of 31-78 years.

Normotensive Controls: 50 normotensive volunteer subjects (27 males and 23 females) with no history of diabetes, hypertension, cardiac or renal diseases with age range of 30-79 years.

After 12 hours fast the blood samples were collected with the help of trained laboratory technician of hospital from all individuals without anticoagulant and centrifuged at 3000 rpm for 5 minutes in pathology department. The serum is collected in fresh vial for biochemical studies and standard methods were used as follows.

Serum Total Cholesterol : CHOD PAP method [10]

Triglycerides : Trinder method [11]

HDL Cholesterol : Phosphotungustic acid method [12]

LDL Cholesterol : LDL-C = Total cholesterol-(HDL-C + Tg/5) [13]

VLDL Cholesterol : VLDL- C = Triglycerides/5 [13]

Above all parameters under investigations were determined by using commercially available reagent kits.

2.4 Statistical Analysis

The collected data were analyzed by SPSS Software version 16.0. All values were expressed as ± S.D. Statistical significance of difference between cases and control groups were evaluated by student's "t" test. A p-value of < 0.05 was considered as significant.

3. RESULTS. Total 120 subjects comprising of 70 hypertensive cases and 50 controls were included in the present study. Measurement of blood pressure, blood glucose and lipid profile, were done in both the groups. The result of the study is given below as shown in **Table 1.**

Age in years	Cases		Controls	
	Male	Female	Male	Female
30-39	04	02	06	07
40-49	06	07	07	05
50-59	09	10	06	05
60-69	09	03	04	02
70-79	10	10	04	04
Total	38	32	27	23

Table 1: Age wise distribution in cases and controls

The hypertensive cases were in the age group of 31-78 years. The mean age of hypertensive subjects was 57.11 years (SD ± 13.48 years) whereas the controls were in the age group of 30-79 and mean age was 50.54 years (SD ± 14.42 years). Out of 70 cases 38 were males and 32 were females and in case of 50 controls 27 were males and 23 were females. The blood pressure was calculated separately as systolic blood pressure and diastolic blood pressure. The mean systolic blood pressure (SBP) of hypertensive subjects was 156.57mmHg (SD ± 24.61 mm of Hg) and that of controls was 113.52 mmHg (SD ± 3.47 mm of Hg). The mean systolic blood pressure was found to be higher in hypertensive subjects than controls ($p< 0.05$). Mean diastolic blood pressure (DBP) of hypertensive cases was 95.11mmHg (SD ± 7.21 mm of Hg) and that of controls was 73.66mmHg (SD ± 3.32 mm of Hg). The mean diastolic blood pressure of hypertensive cases was found to be higher than controls ($p < 0.05$). The results are shown in **Table 2** and **Figure 1.**

Variables	Cases		Control		t value
	Mean	SD	Mean	SD	
SBP(mmHg)	156.57	24.61	113.52	3.47	**12.267 (S)***
DBP(mmHg)	95.11	7.21	73.66	3.32	**19.594 (S)***

*(S)- statistically siginificant ($p < 0.05$)

Table 2: Comparison of Mean SBP and Mean DBP between Cases and controls

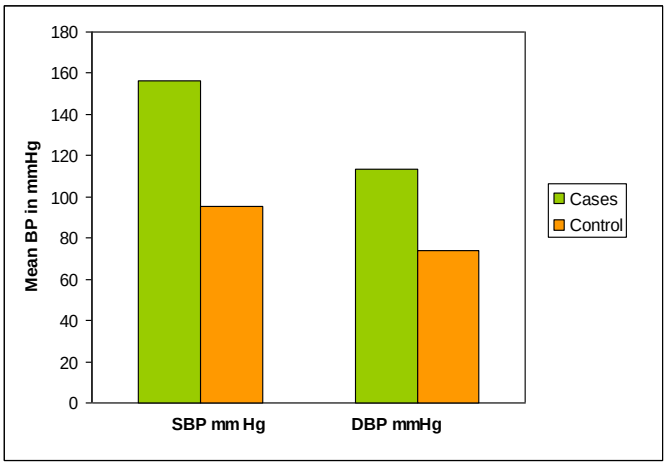

Figure 1: Comparision and Mean values for SBP and DBP between cases and controls

The mean total cholesterol (TC) in hypertensive cases was 205.31 (SD ± 38.44 mg/dl) whereas that of control was 172.74 (SD ± 14.52 mg/dl). The mean of hypertensive cases was higher than controls (p< 0.05). The mean HDL of hypertensive cases was 41.43 (SD ± 5.21 mg/dl) and that of control were 43.91 (SD ± 3.51 mg/dl). The mean HDL of cases was lower than that of controls (p< 0.05) and is statistically significant. Mean LDL of hypertensive cases was 131.68 (SD ± 41.51 mg/dl) and that of controls was 106.10 mg/dl (SD± 14.96 mg/dl). The mean LDL of hypertensive cases was higher than that of controls (p< 0.05). The mean VLDL of hypertensive subjects was 32.51 (SD ± 8.61 mg/dl) and mean VLDL of controls was 23.65 (SD ± 8.11 mg/dl). The mean VLDL of hypertensive cases was higher than controls. The mean Triglycerides (TGL) of hypertensive cases were 162.59 (SD ± 43.08 mg/dl) and that of control was 112.64 (SD ± 16.42 mg/dl). The mean Triglycerides of hypertensive cases were higher than controls (p< 0.05). The results are shown in **Table 3** and **Figure 2**.

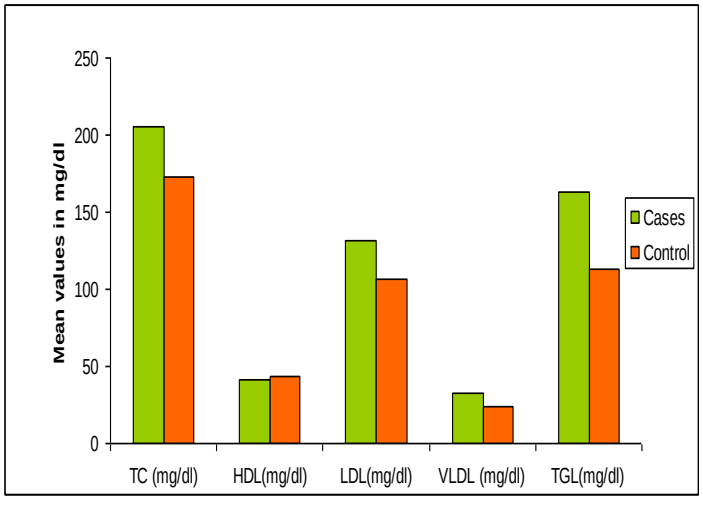

Figure 2: Comparison of mean value for TC, HDL, LDL, VLDL and TGL between cases and controls

Variables	Cases		Control		t value
	Mean	SD	Mean	SD	
TC (mg/dl)	205.31	38.44	172.74	14.52	**5.703 (S)**
HDL(mg/dl)	41.43	5.21	43.91	3.51	**-2.923 (S)**
LDL(mg/dl)	131.68	41.51	106.10	14.96	**4.165 (S)**
VLDL (mg/dl)	32.51	8.61	23.65	8.11	**5.695 (S)**
TGL(mg/dl)	162.59	43.08	112.64	16.42	**7.796 (S)**

* (S)- statistically significant (p < 0.05)

Table 3: Comparison of Mean Lipid profile between cases and controls

4. DISCUSSION

Hypertension is recognized globally as a major public health problem [14]. It is known as the well known risk factor for coronary heart disease, type 2 diabetes mellitus and renal diseases [15-17]. About 80% of hypertensive persons have co morbidities such as obesity, glucose intolerance, hyperinsulenemia, low HDL-Cho, high LDL-Cho and increased triglycerides etc. Two or more co morbidities are found in about more than 50% hypertensive patients. Present study was focused on to study the lipid profile pattern of hypertensive patients compared to controls. In present study the results revealed that the mean value of serum total cholesterol, triglycerides, serum LDL-cholesterol and serum VLDL-cholesterol was significantly higher in hypertensive cases than those of controls. Researchers from Bangladesh conducted a prospective study which is based in the northern region of Bangladesh, to investigate the lipid profile status in hypertensive patients as compared to healthy normotensive controls. Their study revealed similar findings of elevated serum total cholesterol, triglycerides and LDL-cholesterol as observed in our study [18]. Our findings of increased level of total cholesterol in hypertensive subjects are similar to the findings of some other studies [19, 20, 21, 22]. Another study which was carried out in Bangladesh to appraise the lipid profile in hypertensive patients also observed similar findings as observed in our study [23]. A prospective study conducted in Bangladesh on type 2 diabetes mellitus patient with and without hypertension revealed significantly high total cholesterol, triglycerides and LDL- cholesterol in hypertensive patients with type 2 diabetes mellitus as compared to the normotensive type 2 diabetes mellitus subjects [24]. Few studies showed strong association of hypertension and dyslipidimia and suggests that both may increase the patient's susceptibility to the development of coronary heart disease. A study conducted on hypertensive persons in Nigeria found a significantly higher lipid profile except HDL- cholesterol and the findings were similar to the observations of our study [25]. Another study conducted in India on plasma lipoprotein

(a) and lipid profile levels of hypertensive persons showed significantly higher levels of Lp(a) , total cholesterol, Triglycerides, and LDL –cholesterol as compared to healthy controls. Low HDL- Cholesterol level was found among hypertensive patients than controls which is similar to the findings of our study [26]. A study done in Andhra Pradesh on hypertensive persons have shown that the values of TC, TGL, LDL-C and VLDL- C were higher in hypertensive persons than healthy controls. In their study also shown that HDL-C was higher among healthy controls than hypertensive cases but the difference was not found statistically significant [27]. Based on the results obtained from the present study, we conclude that serum lipid profile especially total cholesterol, triglycerides and LDL-cholesterol levels are positively associated with hypertension. Higher levels of these lipids may be contributed due to physical inactivity, stress, increased age, alcohol consumption and high consumption of dietary fat etc. So timely assessment of lipid profile is must in all hypertensive cases to stop further aggravation and risks of coronary artery diseases.

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6. REFERENCES

1. He J., Whelton P.K. Epidemiology and prevention of hypertension. Med.Clin.North AM. 1997; 81: 1077-1097.
2. Whelton PK. Epidemiology of hypertension. *Lancet*. 1994; 344: 202-106.
3. Chobanian AV, Bakris GL, Black HR. The seventh report of the joint national committee on prevention, detection, evaluation and treatment of high blood pressure: the JNC 7th report. JAMA; 289: 2560-2572. Erratum in: JAMA 2003; 290: 197. Comment in: JAMA 2003; 289: 2573-2575. JAMA 2003; 290: 1313-1314; author reply 1314-1315.
4. Ahlawat SK, Singh MM, Kumar R, Kumari S, Sharma BK. Time trends in the prevalence of hypertension and associated risk factors in Chandigarh. *J. Indian Med. Assoc.* 2002; 100(9): 547-552, 554-555, 572.
5. Kumar A, Nagtilak S, Sivakanesan R, Gunasekera S. Cardiovascular risk factors in elderly Normolipidimic acute myocardial infarction patients – A case controlled study from India. *Southest Asian Journal Trop. Med. Public Health*. 2009; 40(3): 581-592.
6. Edward JR. National high blood pressure education programme working group report on hypertension. 1994; 23(3): 274-285.
7. Lipid Research Clinic Programme: The lipid research clinics coronary primary prevention trial results -2 JAMA. 1984; 251: 365-374.
8. Folkow B. Physiological aspect of primary hypertension. *Physiol. Rev*. 1882; 62: 347-503.
9. Deming M. Pathophysiology of systemic arterial hypertension. *J. Exp. Med*. 1958; 172: 1800-1805.
10. Roeschlau P, Bernt E, and Gruber WA, Enzymatic determination of total cholesterol in serum. Z. Klin. *Chem.* 1974; 12(5): 226.
11. Mcgowan MW, Trinder P. et al., A per-oxidase coupled method for the colorimetric determination of serum triglycerides. *Clin Biochem*. 1983; 29:538.
12. Burstein M, Scholnick HR, Morfin R. Rapid method for the isolation of lipoproteins from human serum by precipitation with polyanions. J. Lipid Res. 1970; 11(6):583-595.
13. Friedwald WT, Levy RI and Fredrichseon DS. Estimation of the concentration of low density lipoproteins in plasma without ultracentrifuge. *Clin Chem*., 1972; 18: 499-502.
14. Cappuccio FP, Micah FB, Emmett L. Prevalence, detection, management and control of hypertension in Ashanti, West Africa. *Hypertension*. 2004; 43:1017-1022.
15. World Health Organization. International society of hypertension guidelines for the management of hypertension. J. Hypertens.1999; 17:151-183. Comment in: J. Hypertens. 2001; 19:679-682.
16. Gupta R. Trends in hypertension epidemiology in India. *J. Hum. Hypertens*. 2004; 18: 73-78.
17. Colwell JA, Hot topics: Diabetes. India; Elsevier, 2004.
18. MS Saha, Saha NK, Shaha RK. Serum lipid profile of hypertensive patients in the northern region of Bangladesh. *Journal of Biosciences*. 2006; 14: 93-98.
19. Shahadat H, Maliha R, Iqbal A and Suhrab A. Study of serum lipid profile in essential hypertensive patients. *Mym. Med. J*. 1999; 8(1): 22-25.
20. Adedeji OO and Onitiri AC. Lipids in Nigerian Hypertensives. *Afr. J. Med. Sci*. 1990; 19: 281-284.
21. Assmann G. Lipid metabolism and atherosclerosis. Schattuer verlag- Stuttgart, Germany. 1982.
22. Kristensen BO. Triglycerides and HDL-Cin essential hypertension. *Acta. Med. Scand*. (Suppl.) 1981; 646: 31-42.
23. Sarkar D, Latif SA, Uddin MM, Aleh J, Sutradhar SR, Ferdousi S, Ganguli KC, Wahed F. Studies on serum lipid profile in hypertensive patients. *Mymensingh Med. Journal*. 2007; 16(1): 70-76.
24. Alam SM, Ali S, Khalil M, Deb K, Ahmed A, Akhter K. Serum lipid profile in hypertensive and normotensive type 2 diabetes mellitus patients – a comparative study. *Myamensingh Med. J*. 2003; 1: 13-16.
25. Joseph Osagie Idemudia, Emmanuel Ike, Ugwuja. Plasma lipid Profiles in hypertensives Nigerian. *The Internet Journal of Cardiovascular research*. ISSN: 1540-2592. 6(2). DOI: 10.5580/117f.
26. Bhavani BA, Padma T, Sastry B, Reddy NK. Plasma lipoprotein (a) levels in patients with untreated essential hypertension. *Indian Journal. Hum. Genet*. 2003; 9: 65-68.
27. Lakhshmankumar N, Deepthi J, Rao YN and Kiran Deedi M. Study of lipid profile, serum magnesium and Blood glucose in hypertension. *Biology and Medicine*. 2010; 2(1): 6-16.

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