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A CASE CONTROL STUDY OF LIPID PROFILE AND SERUM URIC ACID LEVELS IN PATIENTS OF CARDIOVASCULAR HYPERTENSION

Biochemistry

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ABSTRACT

Background: Hypertension is a major public health problem which is major risk factor for chronic heart disease, stroke, and coronary heart disease. Hypertension and increased blood levels of triglyceride (TG), total cholesterol (TC), and low-density lipoprotein (LDL) has a widely accepted association. The debate on the association between uric acid and hypertension, controversy still remains.

Material and Method: The study was carried out on 75 subjects of hypertensive patients, and 72 controls. In the study we have investigated changes in biochemical parameters in people suffering from hypertension and compare these values with that normal subjects. Healthy volunteers of 40-60 years who were not suffering from hypertension were selected randomly as controls from the hospital and college.

Results: Most of the patients in both of the groups were in young to middle age group. Cholesterol, TG, VLDL and uric acid was elevated in hypertensive group significantly (P<0.0001), while HDL and LDL levels were not significantly different between the two groups.

Conclusion: Significantly raised cholesterol, triglyceride, VLDL levels are associated with hypertension while HDL and LDL levels show no statistical association. Serum Uric acid levels are also significantly high in hypertensive patients than normotensive controls.

KEYWORDS

Hypertension, Lipid profile, Serum uric acid

INTRODUCTION

Hypertension is a major public health problem due to its high prevalence all over the world.[1] Around 7.5 million deaths or 12.8% of the total of all annual deaths worldwide occur due to high blood pressure.[2] It is predicted to be increased to 1.56 billion adults with hypertension in 2025.[3]

Raised blood pressure is a major risk factor for chronic heart disease, stroke, and coronary heart disease. Elevated BP is positively correlated to the risk of stroke and coronary heart disease. Other than coronary heart disease and stroke, its complications include heart failure, peripheral vascular disease, renal impairment, retinal hemorrhage, and visual impairment.[2]

Cardiovascular disease, hypertension and increased blood levels of triglyceride (TG), total cholesterol (TC), and low-density lipoprotein (LDL) has a widely accepted association.[4]

The Framingham Heart Study data on the hypertensive population showed that more than 80% had at least one risk factors including dyslipidemia.[5] Dyslipidemia, one of the strong predictors of CVD, causes endothelial damage and loss of physiological vasomotor activity. The damage in the endothelium through altered sheer stress and oxidative stress in hypertension, results in increased synthesis of collagen and fibronectin, reduced nitric oxide-dependent vascular relaxation, and increased permeability to lipoprotein by endothelium. It is also associated with an upregulation of lipid oxidation enzymes, especially oxidized LDL contributing to atherosclerosis.[6]

Hyperuricemia has been reported in 26 % of untreated hypertensive patients having normal blood urea nitrogen levels.[7] A study from another northern part of India found hyperuricemia in 37% of hypertensive cases and 17% of controls.[8] But the debate on the association between uric acid and hypertension, controversy still remains.[9]

Thus, thisstudy of lipid profile, and uric acid in hypertensive patients was conducted to study lipid profile (TC, TG, VLDL, LDL and HDL) and acid level in hypertensive patients, and compare these parameters with control and hypertensive patients.

MATERIAL AND METHODS

The present work was conducted in the department of medical biochemistry of Gandhi Medical College, Bhopal in co-ordination with department of cardiology and Department of Biochemistry, Netaji Shubhash Chandra Bose Medical College Jabablpur.

The study was carried out on 75 subjects of hypertensive patients, and 72 controls. In the study we have investigated changes in biochemical parameters in people suffering from hypertension and compare these values with that normal subjects. Biochemical parameters in included

are:-

1. LIPID PROFILE
2. URIC ACID

Healthy volunteers of 40-60 years and and were not suffering from hypertension were selected randomly as controls from the hospital and college. All the cases were taken from ward of hamidia hospital by history all the cases were suffering from hypertension as confirmed by their history and their estimation.

Those patients who were below the age of 20 years of older than 60 years, patients with chronic kidney disease, Gout and those on vitamin A supplements were excluded from the study.

Taking all aseptic and universal precaution 5 ml of blood sample was collected from all cases and controls in plain and sterile vials. Blood was allowed to clot and the serum was separated by centrifugation and different parameters were estimated. Hemolysed samples obtained was analysed for lipid profile and uric acid. Estimation of serum cholesterol was done by enzymatic method end point CHOD-POD method (cholesterol oxidase and per-oxidase method). Serum triglyceride is estimated by enzymatic GPO-POD method (glycerol-3-PO4 oxidase and peroxidase). VLDL-C was calculated as one fifth of triglyceride. Estimation of low density lipoprotein cholesterol was calculated using freidwalds formula [LDL-C = TC (HDL-C +VLDL–C)]. Estimation of uric acid was done by "Uricase / pod , end point assay.

RESULTS AND OBSERVATION

A total 147 patients were included in study, out of which 72 were in control arm of normotensives and 75 patients were in cases arm of hypertensive patients.

Table 1: Distribution of control and cases according to age group

S. No.	Age Group (N=147)	No. of control (n=72)	No. of cases (n=75)

1	18-25	28 (38.89 %)	14 (18.67 %)
2	26-35	26 (36.11 %)	21 (28 %)
3	36-45	08 (11.11 %)	15 (20 %)
4	46-55	06 (8.33 %)	15 (20 %)
5	56 & above	04 (5.56 %)	10 (13.33 %)

Most of the patients in both of the groups were in young to middle age group with 28 (38.89 %) and 26 (36.11 %) patients in 18-25 years and 26-35 years of age groups for controls respectively. There were 14 patients (18.67 %) and 21 (28 %) patients in 18-25 years and 26-35 years of age groups for cases respectively.

Table 2: Comparison of all parameter in cases and control in hypertension

Parameter	Control (n=72)	Cases (n=75)	t-test (p value)
Chol.	176.48±14.1	248.25±41.60	<0.0001
TG	152.48±117.2	230.27±69.19	<0.0001
HDL	49.00±8.80	79.78±335.21	>0.005
LDL	121.00±103.2	143.43±32.62	>0.005
VLDL	31.06±7.07	51.44±16.82	<0.0001
Uric acid	5.31±1.54	16.30±6.82	<0.0001

The above table, comparison of all parameter is shown between hypertensive cases to non-hypertensive controls. Cholesterol, TG, VLDL and uric acid was elevated in hypertensive group significantly (P<0.0001), while HDL and LDL levels were not significantly different between the two groups.

Statistical analysis showed similar profile for male patients where Cholesterol, TG, VLDL and uric acid was elevated in hypertensive group significantly (P<0.0001) when compared to control group, while HDL and LDL levels were not significantly different between the two groups. Among female population this difference of elevated parameters in hypertensive group was significant for all the parameters. There was no statistical difference seen between male and females of in case group and in control group.

In the control group CHOL was highest in 26-35 years age group, TG & HDL in 18-25 years age group, LDL & VLDL in 56 years and above age group and uric acid was highest for 46-55 years age group.

In cases of hypertension CHOL was highest for 56 &above age group along with LDL &VLDL. The TGs was found to be highest in 46-55 age group, and HDL found to be highest in 18-25 year age group, while uric acid found to be highest in 26-35 year age group.

DISCUSSION

In this case-control study, we try to investigate the relationship serum lipid profile and uric acid with hypertension. Results in our study showed that Cholesterol, TG, VLDL and uric acid were significantly elevated in hypertensive group compared to normotensive controls (P<0.0001).

Hypertension is well recognized major risk factor for cardiac and vascular, diabetes, and renal diseases.[10] About four in five hypertensive persons have comorbidities such as obesity, glucose intolerance, abnormalities in lipid metabolism, among others. A prospective study by Islam (2012) et al. compare lipid profile status in hypertensive patients as compared to healthy normotensive controls found similar results of high serum CHOL, TG, and LDL.[11] Our findings of significantly increased levels of CHOL in hypertensive patients were similar to the findings of some other studies as well.[10,12,13]

A wide range of risk factors for CVD has been studied, but few studies have measured the association of CVD risk with hypertension and lipid profile. Previous studies showed the high rate of CVD mortality among South-East Asian compared to the rest of the world and that majority of CVD deaths occur below the age of 70.[14-17] Several studies have shown that most of the hypertensive patients undergo inconsistent treatment, and there was significant instability of serum TC, TG, HDL, and LDL in hypertensive patients.[13,18,19] Therefore, the findings from investigations of these parameters may reinforce routine monitoring of hypertensive patients in daily clinical practice to prevent CVD and other harmful consequences of hypertension.[20]

Elevated uric acid levels are often associated with established traditional cardiovascular risk factors; it is not quite sure whether uric acid is the cause or consequence of hypertension.[21] Hyperuricemia is fairly common with the prevalence between 2.6% and 47.2% in various populations.[22] A significant association has been observed in similar age group to our study (<59 years).[23] A stud y from another northern part of India found hyperuricemia i n 37% of hypertensive cases and 17% of controls[24]

Hyperuricemia was significantly more in male cases than female cases in present study. Other studies found that hyperuricemia w as almost equal in both males and females.[25,26] Bibek et al observed higher prevalence of hyperuricemia in female hypertensives (29.2%) than male hypertensives (28.4%).[25]

In a meta-analysis of 17 studies showed that hyperuricemia could slightly increase the risk of cardiovascular diseases.[27] In different studies on effects of xanthine oxidase inhibitors on renal function and blood pressure in hypertensive patients with hyperuricemia it was observed that these drugs may decrease blood pressur.[28,29]

It can be concluded that increased uric acid levels is significantly associated with hypertension and vice-versa.

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