International Journal of Research in Medical Sciences
Arangi P et al. Int J Res Med Sci. 2020 Apr;8(4):1340-1344
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20201321

Original Research Article

A study of dyslipidemias in newly diagnosed hypertensive patients

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Received: 24 January 2020
Revised: 03 February 2020
Accepted: 28 February 2020

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ABSTRACT

Background: Dyslipidemia and hypertension are a major, common and modifiable risk factor for diseases like a stroke; coronary artery disease etc. which are common causes for mortality in India. Dyslipidemia and hypertension are usually found co-exist, which accelerates the process of atherosclerosis.
Methods: It is a cross-sectional study conducted on the patients who are newly diagnosed hypertensive visited Medical OPD in Konaseema institute of medical sciences between January 2018 to June 2019. All were investigated for various clinical parameters on lipid profile abnormalities. Results were compared among cases and controls.
Results: A total number of patients included in the study were 167,107 are cases and 60 controls. Significant higher levels of total cholesterol, triglycerides, LDL-c and lower levels of HDL-c were observed in hypertensive patients with p-value significant <0.0001.
Conclusions: Hypertensive patients have significantly elevated levels of all forms of cholesterol and a higher percentage of individuals in the dyslipidemic state when compared with normotensive patients. Pre-diabetic state significantly increases the total cholesterol in hypertensive patients.

Keywords: Dyslipidemia, Hypertension, Metabolic syndrome

INTRODUCTION

Hypertension is prevalent in about one-third of adult population in the south East Asia region.[1] Most hypertensive are asymptomatic. Hypertension is an important warning sign which requires significant lifestyle changes. Hence it is considered as a silent killer.[2] Hypertension doubles the risk of ischemic and haemorrhagic stroke, cardiovascular diseases, peripheral arterial diseases, and renal failure.[3]

Dyslipidemia and hypertension are major, common and modifiable risk factors for diseases like Coronary artery disease, stroke etc., which are common causes for mortality in India. Usually, dyslipidemia are asymptomatic, but hypertensive subjects frequently have higher cholesterol levels than normotensives.

Hypertension may be clinically defined as that level of blood pressure at which the institution of therapy reduces BP related morbidity and mortality. In children and adolescents, hypertension is generally defined as systolic and/or diastolic blood pressure consistently > 95th percentile for age, sex, and height.[4]

As per this Table 1, 120/80 mm of hg is normal blood pressure. The elevated blood pressure is between SBP 120 – 129 but DBP should be less than 80. TARGET BLOOD PRESSURE in various age group <65yrs,<130/80 mmHg and >65yrs,<130/80 mmHg.

Table 1: ACC/AHA blood pressure classification.[4]

	Systolic, mmHg	Diastolic, mmHg
Normal	<120	And<80
Elevated	120-129	And <80
Stage 1 hypertension	130-139	Or80-89
Stage 2 hypertension	≥140	Or≥90
Target blood pressure in various subsets	<65years, <130/80 mmHg >65years, <130/80 mmHg	

Dyslipidemia is defined as a disorder of lipoprotein metabolism, including lipoprotein deficiency or overproduction or both.[5] Dyslipidemia may be manifested by increase ofthe total cholesterol (TC), the low-density lipoprotein cholesterol (LDL-c) and the triglyceride concentrations (TG), and a decrease in the high-density lipoprotein cholesterol (HDL-c) concentration in the blood.[6]

Lipitension

Dyslipidemia and hypertension are usually found to co-exist, though the association is common and been proved by various studies, the reason for this co-occurrence has not been probed out yet. Many studies have proven that this co-existence accelerates the process of atherosclerosis than in patients with a single disorder.[7]

Metabolic syndrome is the constellation of insulin resistance, abdominal obesity, hypertension, and dyslipidemia.

NCEP: ATP III, 2005 Criteria for metabolic syndrome[8]

(National Cholesterol Education Program and Adult Treatment Panel III)

Criteria: Three or more of the following:

- Central obesity waist circumference for male>40 inches and female>35 inches.
- Dyslipidemia: Triglycerides >=150 mg/dl or on medication
- Dyslipidemia(second separate criteria): HDL-C<40 mg/dl for males and < 50 mg/dl for female; oron medication.
- Hypertension: Blood pressure>130 mm Hg Systolic or >85mmHgdiastolic or on treatment.
- Hyperglycemia: Fasting plasma glucose(FPG) levels: >= 100 mg/dl or on treatment.

Aims of this study was to present study designed to study the pattern and prevalence of lipid profile abnormalities in newly diagnosed hypertensive patients. To study the influence of various clinical parameters, biochemical, demographic parameters on lipid profile abnormalities in newly-hypertensive patients.

METHODS

Patients who are newly diagnosed as hypertensive are the study population attending Medicine OPD of Konaseema Institute of Medical Sciences and Research Foundation (KIMS&RF), Amalapuram, East Godavari District. The study period is from January 2018 to June 2019.The study design is a prospective cross-sectional study.

The sample size is 167 patients were included according to inclusion and exclusion criteria. In the study, 107 are cases and 60 are controls. Ethics committee clearance. Participants were explained about the study, and informed consent was obtained from all the subjects.

Inclusion criteria

Cases are newly detected hypertensive patients of age group between 21-75 yrs. Control group is non-hypertensive patients of same age group, who attended medical OPD for other minor illnesses.

Exclusion criteria

- Patients with a history of hypertension and onanti-hypertensive drugs which are likely to modify the lipid profile. Patients with secondary hypertension.
- Newly diagnosed hypertensive patients with one or more complications like Cerebro vascular Accident (CVA), Ischemic heart disease(IHD),retinopathy and nephropathy at presentation.
- Hypertensive diabetic patients.
- Hypertensive patients who are alcoholic.

Clinical examination

Blood pressure (BP) was measured in the right arm, patient in the supine posture, after 5 mins of rest and arm supported at heart level. Two such BP readings were taken at least 24 hours apart, and the average of the two was taken.

Investigations

After an overnight 12 hrs fasting, 5 ml of venous sample was collected. The TC, TG and HDL-c were determined using the enzymatic colorimetric method with the help of an auto-analyzer. The LDL-c is estimated using the Friedewald formula:[9]

LDL-c = TC- HDL-C-(TG/2.2)mmol/L(or) LDL-C= TC-HDL-C-(TG/5)mg/dL

Patients with following lipid profile values were considered dyslipidemic:

TC >= 200 mg/dl(or)

TG >=150 mg/Dl (or)
LDL-c >=130 mg/dL (or)
HDL-C <40 mg/dL.

Participants with fasting blood glucose values from100-125 mg/dL and postprandial blood glucose values from 140-199 mg/dL were considered to be pre-diabetic. Unpaired, double-tailed student's T-test was used to find out the significance of the difference between the two means. The significance of the difference in the prevalence of dyslipidemia among each group was analysed using the chi-square test.

RESULTS

In order to study the prevalence of dyslipidemia, patients with hypertension compared with the normotensive group. The various parameters on the lipid profile are studied. Patients from the hypertensive group are only selected. In the study, patients who are tested positive for the parameters act as cases and those who are tested negative act as controls. The results were calculated and compared using standard deviation, mean, chi-square test and p-values.

Two types of analysis were done with the available data. The mean values of total cholesterol(TC) and other sub-groups of cholesterol like TG, LDL-c, VLDL-c, HDL-c are calculated for the cases and controls, and their differences were analysed for statistical significance. The percentage of dyslipidemia prevalence among cases and controls are calculated and compared.

Table 2: Basic biochemical, demographic and clinical parameters.

Parameters	Mean
Age	55.9159±5.230
SBP	162.710±3.523
DBP	93.2897±5.034
FBS	95.7196±12.567
PPBS	126.121±12.23
TC	196.804±12.235
TG	197.312±15.02
LDL	119.153±17.04
HDL	37.935±15.345
VLDL	40.0617±2.348

As per Table 2, age of our study group was in the range of 30 to 75 years. SBP of the study range is 130 to 200mm Hg. DBP is 40 to 140mm Hg. TC was in the range of 150 to 283 mg/dl. TG was 58 to 350 mg/dl. LDL-c was 64 to 190mg/dl. HDL-c was in the range of 24 to 53 mg/dl. VLDL-c was in the range of 12 to 68 mg/dl.

As per Table 3, in this study group, cases showed the TC mean value higher than controls by 31. Cases showed the TG mean value higher than controls by 77, and LDL-c is higher in cases by 20.6, and HDL-c lower in cases by 4.4 compared to controls. The total cholesterol, LDL-c and triglycerides are significantly higher, and HDL-c is lower in hypertensive patients (cases) when compared with non-hypertensive patients(control).

Table 3: Mean lipid values: cases vs controls.

Lipid	Number		Mean	SE	p’
TC	Cases	107	197	2.67	<0.0001
	Control	60	166	2.77	Significant
TG	Cases	107	197	7.03	<0.0001
	Control	60	120	5.40	Significant
LDL	Cases	107	119	2.45	<0.0001
	Control	60	98.4	2.74	Significant
HDL	Cases	107	37.9	0.63	<0.0001
	Control	60	42.3	0.98	Significant

As per Table 4, In this study, Cases have a significantly higher percentage of dyslipidemia when compared with control. TC, TG showed significant p-value <0.0001. LDL-c showed significant p-value < 0.0003. HDL-c showed significant p-value<0.005.

Table 4: Percentage of dyslipidemia: cases vscontrol.

Lipid	Number		Percent	p’
TC	Cases	107	43.92	<0.0001
	Control	60	5	Significant
TG	Cases	107	84.11	<0.0001
	Control	60	20	Significant
LDL	Cases	107	28.03	0.0003
	Control	60	5	Significant
HDL	Cases	107	53.27	0.005
	Control	60	30	Significant

Table 5: Mean lipid values: stages of hypertension.

Lipid	Number		Mean	SE	p’
TC	Stage -1	32	191	4.02	0.19
	Stage -2	75	199	3.37	In-significant
TG	Stage -1	32	195	15.73	0.86
	Stage -2	75	198	7.54	In-significant
LDL	Stage -1	32	114	4.22	0.153
	Stage -2	75	121	2.98	In-significant
HDL	Stage -1	32	37.8	1.13	0.899
	Stage -2	75	38.0	0.76	In-significant

As per Table 5, there is no significant difference in mean lipid values between patients in stage-1 and stage-2 hypertension. The mean value of total cholesterol was191 mg/dl in stage 1 group and 199 mg / dl in stage 2 group.

The mean value of triglyceride was 195 mg/dl in stage 1 group and 198 mg / dl in stage 2 groups. The mean value of LDL was 114 mg/dl in stage 1 group and 121 mg / dl

in stage 2 groups. The mean value of HDL was 37.8 mg/dl in stage 1 group and 38.0 mg / dl in stage 2 groups.

Table 6: Percentage of dyslipidemia: pre-diabetic vsnon-diabetic.

Lipid	Number		Percentage	p'
TC	Pre-diabetic	35	62.85	0.0059
	Non-diabetic	72	34.72	Significant
TG	Pre-diabetic	35	82.85	0.8081
	Non-diabetic	72	84.72	In-significar
LDL	Pre-diabetic	35	42.85	0.0173
	Non-diabetic	72	20.83	Significant
HDL	Pre-diabetic	35	42.85	0.1323
	Non-diabetic	72	58.33	In-significar

As per Table 6, significantly higher percentages of pre-diabetic hypertensive patients have their total cholesterol and LDL cholesterol in dyslipidemic range when compared with non-diabetic hypertensive patients.TC and LDL-c showed significant p-values as 0.0059 and 0.0173, respectively. TG and HDL-c showed no significant p-values.

DISCUSSION

About 43.92% hypertensive and 5% normotensive, has high TC (200 mg/dl). High TG (150 mg/dL) are found in 84.11% of the hypertensive and 20% normotensive group. The high LDL-c in the groups is 28.03% and 5% in controls. The low HDL-c (<40 mg/dl) is seen in 53.27% of hypertensive patients and 30% in normotensive group. All these values, when analyses using the Chi-square test, are statistically significant.

The results are similar to the studies conducted by J. Idemudia E. Ugwuja in Nigeria, which showed a significantly elevated plasma TC, TG and LDL-c in hypertensive patients when compared with normotensive patients.[10] Studies conducted by NK. Saha, M.S. Saha and Ranajith Kumar Saha in northern Bangladesh also showed a significantly high TC, TG and LDL values (TC-291.25 mg/dl vs.182.14 mg/dl,TG-184.77 mg/dl vs 142.73 mg/dl and LDL-154.32 mg/dl vs105.73 mg/dl) and significantly lower HDL-c values (32.91 mg/dl vs42.88 mg/dl) in hypertensive patients when compared with normotensive patients.[11]

Studies by Abdishakur Abdulla, Nico Negelkerke in UAE showed a significantly higher level of VLDL and TG among hypertensive patients but not TC and LDL levels.[12] Studies conducted in Spain by D. Rueda and A. Maldonado showeda significantly high TC and TG than normotensive controls.[13]

Effect of stages of hypertension

There was no significant difference between lipid profile of group 1 and group 2.A study conducted by Hilal Y, Acar TN, Koksal E, et al, showed significantly high values of TC and LDL-c among stage - 2 hypertensives but no significant difference in mean values of HDL-c and TG.[14]

Effect of a pre-diabetic state

In hypertensive patients with their blood sugar values in the pre-diabetic range, the lipid profile showed high mean values of TC, LDL-c, TG when compared with the values of hypertensive patients with normal blood sugar. Among the hypertensive patients with normal blood sugar levels, only total cholesterol was significantly high.[15]

CONCLUSION

Hypertensive patients have significantly elevated levels of all forms of cholesterol and a higher percentage of individuals in the dyslipidemic state when compared with normotensive persons. Pre-Diabetic state significantly increases the total cholesterol in hypertensive patients. The stage of hypertension does not alter the lipid profile in hypertensive. As a measure of prevention, better to start astatin for a patient with hypertension and diabetic, though the evidence of dyslipidemiais not clear.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Arangi P, Medabalimi RL, Acharya A. A study of dyslipidemias in newly diagnosed hypertensive patients. Int J Res Med Sci 2020;8:1340-4.