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Assessment of patterns of dyslipidaemia amongst hypertensive patients

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Abstract
Background: Abnormalities in serum lipid and lipoprotein levels (Dyslipidaemia) are recognized as major modifiable cardiovascular disease (CVD) risk factors and have been identified as independent risk factors for essential hypertension giving rise to the term dyslipidemic hypertension. The present study was conducted to assess patterns of dyslipidaemia amongst hypertensive patients.
Materials and Methods: 76 hypertensive patients of both genders were recruited. Group I consisted of hypertensive patients and group II had healthy control. Systolic (SBP) and diastolic (DBP) blood pressures, Body mass index (BMI), Fasting blood glucose and fasting serum lipid profile was recorded.
Results: Group I had 40 males and 36 females and group II had 38 males and 38 females. In group I and group II, SBP (mm Hg) was 162.4 and 116.4, DBP (mm Hg) was 98.4 and 70.2, BMI (kg/m^2) was 28.6 and 26.2, WC (cm) was 96.4 and 90.4, WHR was 0.98 and 0.94, FBS (mmol/L) was 5.1 and 4.6, TG was 1.24 and 1.10, HDL-c was 1.26 and 1.24, LDL- c was 3.01 and 2.42 and TC was 4.82 and 4.15 respectively. Elevated TC (≥5.2 mmol/L) was seen in 34% and 7.5%, elevated TG (≥1.7 mmol/L) in 7% and 1%, elevated LDL-C (≥3.4 mmol/L) in 29% and 6.2%, low HDL-C (<1.04 mmol/L) in 22% and 15%, no lipid abnormality in 46% and 72%, one lipid abnormality in 20% and 16% and >2 lipid abnormality in 24% and 12% in group I and II respectively.
Conclusion: There was high patterns of dyslipidemia amongst hypertensive patients as compared to healthy subjects.

Keywords: Cardiovascular disease, hypertensive, serum lipid

Introduction
Abnormalities in serum lipid and lipoprotein levels (Dyslipidaemia) are recognized as major modifiable cardiovascular disease (CVD) risk factors and have been identified as independent risk factors for essential hypertension giving rise to the term dyslipidemic hypertension [1, 2]. Dyslipidaemia is more common in untreated hypertensives than normotensives, and lipid levels increase as BP increases [3]. Though no specific pattern of dyslipidaemia 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 [4]. In general, black Africans have been reported to have lower serum total cholesterol and higher high-density lipoprotein cholesterol (HDL-C) than whites and other blacks in industrialized countries; however, as in Westernized countries, age, sex, socioeconomic status, and diet also significantly affect lipid levels in healthy Africans [5].
Previous human studies had reported common patterns of dyslipidaemia in hypertension as include; increased total plasma cholesterol, triglyceride and low- density lipoprotein (LDL-C) cholesterol, decreased high-density lipoprotein (HDL-C) cholesterol, changes in the composition of LDL-cholesterol *viz*, small dense LDL-cholesterol, and increased electronegativity of LDL-cholesterol [6]. These changes make LDL-cholesterol susceptible to oxidation and glycation, with foam cell formation, endothelial dysfunction and thus atherosclerosis [7]. The present study was conducted to assess patterns of dyslipidaemia amongst hypertensive patients.

Materials and Methods
The present study comprised of 76 hypertensive patients of both genders. All were enrolled with their written consent. Demographic profile of each was recorded. Group I consisted of hypertensive patients and group II had healthy control.

Physical examination was carried out and blood pressure such as systolic (SBP) and diastolic (DBP) blood pressures was recorded. Body mass index (BMI) was calculated as weight, divided by height squared (kg/m^2). Hip and waist were measured to the nearest 1 cm and waist-to-hip ratio (WHR) was calculated as waist circumference divided by hip circumference. Fasting blood glucose and fasting serum lipid profile such as serum total cholesterol (TC), high density lipoprotein cholesterol (HDL-C), and triglycerides (TG) were determined enzymatically, while low density lipoprotein cholesterol (LDL-C) was calculated using the Fried Wald formula. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table 1: Distribution of patients

Groups	Group I	Group II
Status	Hypertensive	Control
M:F	40:36	38:38

Table I shows that group I had 40 males and 36 females and group II had 38 males and 38 females.

Table 2: Assessment of biochemical profile

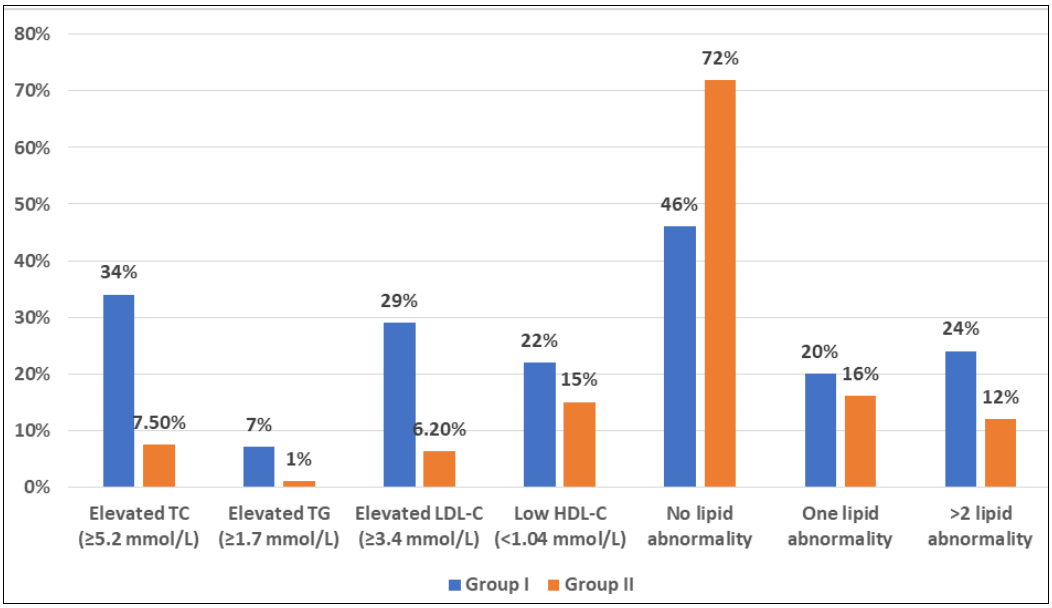
Parameters	Group I	Group II	P value
SBP (mm Hg)	162.4	116.4	0.05
DBP (mm Hg)	98.4	70.2	0.04
BMI (kg/m^2)	28.6	26.2	0.16
WC (cm)	96.4	90.4	0.05
WHR	0.98	0.94	0.21
FBS (mmol/L)	5.1	4.6	0.05
TG	1.24	1.10	0.17
HDL- c	1.26	1.24	0.92
LDL- c	3.01	2.42	0.05
TC	4.82	4.15	0.18

Table II shows that in group I and group II, SBP (mm Hg) was 162.4 and 116.4, DBP (mm Hg) was 98.4 and 70.2, BMI (kg/m^2) was 28.6 and 26.2, WC (cm) was 96.4 and 90.4, WHR was 0.98 and 0.94, FBS (mmol/L) was 5.1 and 4.6, TG was 1.24 and 1.10, HDL-c was 1.26 and 1.24, LDL-c was 3.01 and 2.42 and TC was 4.82 and 4.15 respectively.

Table 3: Prevalence of serum lipid abnormalities

Lipid abnormality	Group I	Group II	P value
Elevated TC (≥5.2 mmol/L)	34%	7.5%	0.01
Elevated TG (≥1.7 mmol/L)	7%	1%	0.03
Elevated LDL-C (≥3.4 mmol/L)	29%	6.2%	0.04
Low HDL-C (<1.04 mmol/L)	22%	15%	0.05
No lipid abnormality	46%	72%	0.05
One lipid abnormality	20%	16%	0.12
>2 lipid abnormality	24%	12%	0.05

Table III, graph I shows that elevated TC (≥5.2 mmol/L) was seen in 34% and 7.5%, elevated TG (≥1.7 mmol/L) in 7% and 1%, elevated LDL-C (≥3.4 mmol/L) in 29% and 6.2%, low HDL-C (<1.04 mmol/L) in 22% and 15%, no lipid abnormality in 46% and 72%, one lipid abnormality in 20% and 16% and >2 lipid abnormality in 24% and 12% in group I and II respectively. The difference was significant (p< 0.05).



Graph 1: Prevalence of serum lipid abnormalities

Discussion

Dyslipidaemia and hypertension are independent cardiovascular risk factors that are linked by insulin resistance and commonly coexist with other cardiovascular risk factors such as dysglycaemia and truncal obesity in a cluster as seen in metabolic syndrome [8]. Insulin resistance is related to lipoprotein lipase deficiency which affects lipid metabolism and consequent dyslipidaemia [9]. Also, insulin resistance is associated with abnormal redistribution of fatty acids, including its influx in the liver and other abdominal viscera, producing tumor necrosis factor alpha (TNF-a), which is thought to be key in truncal obesity, a feature currently recognized as a constant component of the metabolic syndrome [10]. Interestingly, in animal studies, a

gene, the cd36 gene which encodes fatty acid translocase, appears to underlie insulin resistance, defective fatty acid metabolism and dyslipidaemia in hypertension [11]. The present study was conducted to assess patterns of dyslipidaemia amongst hypertensive patients.

We found that group I had 40 males and 36 females and group II had 38 males and 38 females. Henry *et al*. [12] found that the most frequent dyslipidaemic form was reduced HDL, seen in 96.1% and 94% of new and old respectively; followed by elevated LDL, 86% and 48.2% in new and old respectively. The female gender related significantly, $p<0.05$, with elevated total cholesterol and elevated LDL in the new group, and reduced HDL in the old group.

We found that in group I and group II, SBP (mm Hg) was 162.4 and 116.4, DBP (mm Hg) was 98.4 and 70.2, BMI (kg/m^2) was 28.6 and 26.2, WC (cm) was 96.4 and 90.4, WHR was 0.98 and 0.94, FBS (mmol/L) was 5.1 and 4.6, TG was 1.24 and 1.10, HDL-c was 1.26 and 1.24, LDL-c was 3.01 and 2.42 and TC was 4.82 and 4.15 respectively. Osuji *et al*. [13] examined the serum lipid patterns of newly diagnosed hypertensive patients attending a tertiary healthcare centre in South East Nigeria. Two hundred and fifty newly diagnosed adult hypertensive patients and an equal number of age- and sex-matched controls without hypertension were consecutively recruited. 126 males and 124 females were in each of the two groups. Mean age was comparable in both groups. Hypertensives had significantly higher mean systolic blood pressure, diastolic blood pressure, body mass index, waist circumference, waist-hip ratio, and fasting blood sugar than the controls. The mean TC, TG, and LDL-C were significantly higher among the hypertensives. The mean HDL-C was comparable; P = 0.8. Among the hypertensive subjects, there was statistically significant positive correlation between BMI and TC; LDL-C and TG; WC and TG; FBS and TC; LDL-C and TG. HDL-C showed a statistically significant inverse correlation with WHR in hypertensives.

We found that elevated TC (≥5.2 mmol/L) was seen in 34% and 7.5%, elevated TG (≥1.7 mmol/L) in 7% and 1%, elevated LDL-C (≥3.4 mmol/L) in 29% and 6.2%, low HDL-C (<1.04 mmol/L) in 22% and 15%, no lipid abnormality in 46% and 72%, one lipid abnormality in 20% and 16% and >2 lipid abnormality in 24% and 12% in group I and II respectively. Eapen *et al*. [14] showed that male and female patients with low HDL-C levels (<35 mg/dL) and with normal total cholesterol levels have more cardiovascular events (Such as heart attacks and unstable chest pain) as compared to their adult counterparts with high HDL-C levels. There is strong epidemiological evidence that low HDL-C is an independent risk factor for CVD The limitation the study is small sample size.

Conclusion

Authors found that there was high patterns of dyslipidaemia amongst hypertensive patients as compared to healthy subjects.

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