Comparison of Lipid Profile Status between Hypertensive and Normotensive People of Bangladesh

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Hypertension is one of the most common diseases treated by physicians. It may be associated with dyslipidemia, central obesity, glucose intolerance and hyperinsulinemia. The lipid profile of hypertensive patients of Bangladesh is not known. To compare the levels of lipid profile in hypertensive patients with normotensive subjects. This cross-sectional comparative study was conducted in the Department of Physiology, Dhaka Medical College, Dhaka, Bangladesh during the period of January, 2008 to December 2008. The study recruited 80 subjects, 40 subjects were control and 40 had essential hypertension. Both the groups were age and sex matched. The protocol of the study was approved by ethics review committee of Dhaka Medical College. The study subjects were enrolled through convenient sampling. Informed written consent were taken from every study subjects. Blood pressure and fasting lipid profile of all patients were assessed. Almost two-third (67.5%) patients of hypertensive group and 70.0% subjects of the control group were male (p=0.809). Hypertensive patient group had significantly higher BMI (p<0.001), waist-hip ratio (p<0.001), systolic (p<0.001) and diastolic blood pressure (p<0.001) than normal group. In comparison to the normal control group, hypertensive patients had significantly higher serum total cholesterol (p <0.001), LDL-c (p<0.001) and triglyceride level (p<0.001) and significantly lower HDL-c level of (p<0.001). The serum TC, LDL-c and TG level were higher and HDL-c was lower in the hypertensive patients than those in the healthy controls.

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Key words: Hypertension, lipid profile

Introduction

Blood pressure is the force that drives blood through blood vessels to supply oxygen and nutrients to the body's organs and tissues and carry away metabolites and waste materials.[1] Blood pressure is optimal if the systolic blood pressure (SBP) is lower than 120mmHg and diastolic blood pressure (DBP) is less than 80mm Hg.[1] Hypertension is one of the most common diseases treated by physicians.[2] It is a common health problem worldwide and with ongoing global increase in the incidence.[1] Hypertension is defined as a systolic BP ≥ 140 mm Hg and or diastolic BP ≥ 90 mm Hg.[3] Essential hypertension is a complex multifaceted disorder, which may include other abnormalities including dyslipidemia, central obesity, glucose intolerance and hyperinsulinemia.[4]

According to estimates by the WHO 2001, coronary vascular disease (CVD) accounts for 29% of all deaths and 11% of disease burden in the South-East Asia.[5] Epidemiological studies have established a strong association between hypertension and CVD.[6] The prevalence of hypertension is projected to increase globally, especially in the developing countries.[7] In recent years, rapid urbanization, increased life expectancy, unhealthy diet, and lifestyle changes have led to an increased rate of CVD in Southeast Asia, including Bangladesh.[8] The prevalence of hypertension among adults in Bangladesh varies from 16% to 20% and 34% .[9,10,11]

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Hypertension and dyslipidemia are major risk factors for CVD and account for more than 80% of deaths and disability in low- and middle-income countries.[7,12,13,14] For these complications hypertension accounts for 9.4 million deaths world wide.[13,15] It is widely accepted that cardiovascular disease is associated with hypertension.[16,17] and elevated blood levels of low-density lipoprotein cholesterol (LDL-c), total cholesterol (TC), and triglycerides (TG).[17,18] In contrast, a low level of high density lipoprotein cholesterol (HDL-c) is a risk factor for mortality from cardiovascular disease.[17,18] According to the guidelines of the American Heart Association, the following values are prescribed for the above-mentioned risk factors for cardiovascular disease: blood pressure: <130/85 mm Hg; total cholesterol: <200 mg/dL; triglycerides: <200 mg/dL; HDL: >40 mg/dL; and LDL: <130 mg/dL.[19] Blood pressure however, is not the only determinant of cardiovascular damage. The propensity of hypertensive patients to develop target organ damage is markedly influenced by coexisting risk factors such as age, sex, smoking, alcohol intake, diabetes, blood lipids and dyslipidaemia, obesity, and body fat distribution. [2,4,20,21,22] Dyslipidemias are disorders of lipoproteins metabolism, including lipoprotein overproduction or deficiency.[23] Among these factors lipoproteins arefundamental to the atherosclerotic process and greatly affect the impact of hypertension on development of target organ damage and therefore on cardiovascular morbidity and mortality.[2] In Bangladesh, consumption of saturated fat and red meat is a known risk factor for CVD.[24]

Although blood pressure (BP) control is crucial in hypertensive patients, clinical practice guidelines agreed that the goal of treatment should be aimed at not only decreasing BP but reducing global cardiovascular risk.[25] Choudhury et al (2014)[26] demonstrated that patients with hypertension are more likely to exhibit dyslipidemia, including elevated TC, LDL, TG, and reduced HDL cholesterol levels than normotensive patients. They suggested that hypertensive patients need measurement of BP and lipid profile at regular intervals throughout their primary health care to prevent CVD and stroke. A study conducted in the Eastern Nepal has showed the direct association of dyslipidemia and BMI in hypertensive patients.[27] In western population some studies have established the relation between hyperlipidemia and hypertension.[28]

Early detection and management of high blood pressure can help in reducing the risk of heart attack, heart failure, stroke and kidney failure.[29] Keeping in mind this study was carried out in the Department of Physiology, Dhaka Medical College with the aims and objectives to assess the levels of lipid profile in hypertensive subjects and compare it with normotensive subjects.

Methods

This was a cross-sectional comparative study. The study was conducted in the Department of Physiology, Dhaka Medical College, Dhaka, Bangladesh during the period of January, 2008 to December 2008. The study recruited 80 subjects, 40 subjects were control and 40 had essential hypertension. Both the groups were age and sex matched. Patients aged more than 30 years with systolic blood pressure >160 mmHg but <200 mmHg and diastolic blood pressure >90 mmHg but <115 mmHg were enrolled as cases. Female patients were non-pregnant. Exclusion criteria were: aged less than 30 years patients with thyroid disease, diabetes mellitus, renal diseases, oral contraceptive pills, steroids and lipid lowering, β blocker and thiazid drugs. The protocol of the study was approved by ethics review committee of Dhaka Medical College.

The study subjects were selected from the OPD of Medicine and Cardiology of Dhaka Medical College Hospital, Dhaka who attended there for hypertension. The control group was healthy volunteers accompanied by the patients. They were enrolled through convenient sampling. After selection of the subjects the objectives, nature, purpose and potential risk of all procedures used for the study were explained to the subjects in details and informed written consent were taken from every study subjects.

Full history was taken and complete physical examination was done on both groups, height and weight were measured with subject in light clothes without shoes, and body mass index, B.M.I,(Kg/m^2) was calculated. Blood pressure was taken in the resting condition (5 minutes) in supine position.

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Then after taking all aseptic precaution 4 ml of venous blood were collected from all study subjects during fasting condition for estimation of TC, TG, LDL -c HDL-c. Data were collected by using a pre-tested questionnaire. Fasting TG were estimated by enzymatic colorimetic method (GPO-POP), TC and HDL-c by enzymatic endpoint (CHOD–PAP) method after precipitation of LDL and VLDL with phosphotungstic acid in the presence of magnesium chloride. Fasting serum LDL -cl was calculated by Friedwald formula: LDL-c = [TC -HDL-c] - TG /5.

Statistical package for social sciences version 12 (SPSS v.16) was used for data analysis. Discrete or categorical data was expressed as frequency and percentage. Association between discrete variables was tested by Chi square test. The continuous data was expressed as mean ±SD and difference of mean between two normally distributed continuous variables was tested by Student t test. P value less than 0.05 were considered significant.

Results

Lipid profile was estimated from fasting samples collected from 80 subjects divided into two groups. Of them 40 were normal healthy control (group I) and another 40 had essential hypertension (group II). The present study intended to compare the serum lipid profile between hypertensive patients and normal subjects. The continuous data was expressed as mean (±SD) and statistical significance of difference between two groups were calculated by using Student t test. Result of the biochemical parameters in this study were expressed as below:

Age distribution

Table I. Distribution of patients by age between two study groups (n=80)

Age (Years)	Groups		
	Group I (n=40) Frequency (%)	Group II(n=40) Frequency (%)	p-value
30-39	8(20.0)	4(10.0)	0.848*
40-49	10(25.0)	12(30.0)	
50-59	6(15.0)	7(17.5)	
>60	16(40.0)	15(37.5)	

*p value derived from chi-square test

Comparison of the age distribution between the two study groups was homogeneous (p=0.848, Table I)

Gender distribution of patients

Table II: Distribution of patients by gender between two study groups [n=80]

Groups	Male Frequency (%)	Female Frequency (%)	p
Group I(n=40)	28 (70.0)	12(30.0)	.809*
Group II(n=40)	27 (67.5)	13(32.5)	

*p value derived from chi-square test

Table II shows that 70.0% subjects of the control group and almost two-third (67.5%) of

the hypertensive group were male while 30.0% of control group and one-third (32.5%) patients of hypertensive group were female. The male-female proportion of the two groups was similar (p=0.809)

Habit of physical exercise

Table III: Distribution of patients by habit of physical exercise

Habit of physical exercise	Control (n=40)	Hypertensive (n=40)	p-value
	Frequency (%)	Frequency (%)	
Yes	34(85.0)	20(50.0)	0.001
No	6(15.0)	20(50.0)	

*p value derived from chi-square test

Majority (85%) of the patients of the control group and 50% of hypertensive group had habit of taking physical exercise. Habit of taking physical exercise was significantly lower in the hypertensive group compared to that in the control group (p=0.001, Table III)

Physical examination

Table IV: Comparison of physical examination between two groups

Physical examination	Group I (n=40)	Group II (n=40)	p-value
	Mean± SD	Mean ± SD	
BMI(kg/m^2)	23.01±0.80	26.9±0.65	<0.001*
Waist : Hip	0.93±0.85	1.4±0.59	<0.001*
Systolic BP(mmHg)	111.9±6.6	150.4±14.7	<0.001*
Diastolic BP (mmHg)	73.8±8.9	103.00±9.0	<0.001*

*p value derived from Student t test

The data shows that in comparison to the normal control group, hypertensive patient group had significantly higher BMI (23.01±0.80 vs 26.9±0.65, p<0.001), waist-hip ratio (0.93±0.85 vs 1.4±0.59, p<0.001), systolic (111.9±6.6 vs 150.4±14.7 mmHg, p<0.001) and diastolic blood pressure (73.8±8.9 vs 103.00±9.0, p<0.001, Table IV)

Lipid profile

Table V: Comparison of lipid profile among the three groups

Lipid Profile	Group I	Group II	P-value
Serum total Cholesterol	280.39±33.9	339.7±75.7	<0.001*
Serum LDL	124.4±28.2	207.5±49.6	<0.001*
Serum Triglyceride	229.7±44.2	352.0±102.6	<0.001*
Serum HDL	47.6±7.8	42.9±10.2	<0.001*

*p value derived from Student t test

Data shows that in comparison to the normal control group, hypertensive patient group had significantly higher serum total cholesterol level (339.7±75.7 vs 280.39±33.9, p <0.001), serum LDL (207.5±49.6 vs 124.4±28.2, p<0.001) and serum triglyceride (352.0±102.6 vs 229.7±44.2, p<0.001). Serum HDL-c level of hypertensive patient group was significantly lower than normal control group (42.9±10.2 vs 47.6±7.8, p<0.001, Table V).

Discussion

Hypertension is already recognized as one of the major risk factors in the development of coronary atherosclerosis, it frequently coexist with other risk factors, especially dyslipidemia, which may act synergistically in the pathogenesis of atherosclerosis disease.

The present study found that hypertensive patient group had significantly higher BMI (p<0.001), waist-hip ratio (p<0.001), systolic (p<0.001) and diastolic blood pressure (p<0.001) than normal control group. These findings were similar to the findings of Chowdhury et al (2014).[26] They found that

the mean SBP and DBP were 137.9±9.6 mmHg and 94.4±8.8 mmHg, respectively.

The present study revealed a significant relationship between dyslipideamia and hypertension. In comparison to the control, the mean value of serum TC ($p < 0.001$), serum LDL-c ($p < 0.001$) and TG ($p < 0.001$) were significantly higher while the serum levels of HDL-c ($p<0.001$) were significantly lower in hypertensive patients than control groups. These observations were consistent with the results of the previous studies done by Gorial et al., (2012);[30] Saha, Sana, and Ranajit (2006),[31] Lepirl et al., (2005);[32] Baral et al., (2006);[27] Ali et al., (2007),[33] Yukoohta, et al., (2009),[34] Sharma et al (2010)[35] and ldemuda (2009).[13] These studies showed an increase in the prevalence of dyslipideamia in hypertensive patients.

The finding of the present study was also similar to the findings of Bangaldeshi studies conducted by Saha, Sana, and Ranajit (2006)[31] and Choudhury et al (2014).[26] Saha, Sana, and Ranajit (2006)[31] carried out a prospective study in the northern region of Bangladesh. They found high serum TC, TG, and LDL in hypertensive patients than normotensive controls. Choudhury et al (2014) [26] also found similar result in their study ($p<0.001$).

Obesity is currently considered a common risk factor for many chronic diseases. Our hypertensive patients had significantly higher BMI also. This finding is in line with the finding of the study by Gorial et al (2012).[30] They found that the hypertensive patients had significantly higher body mass index than controls (P=0.005).The hypertensive patients had significantly higher TC, TG, LDL-c), and lower HDL-c, than control group.

Several limitations may affect the findings of the present study. One of them is small size. Another limitation is that the data was collected from a tertiary care hospital of Bangladesh. Due to these limitations the result of this study may not represent the all hypertensive patients of Bangladesh.

Conclusion

The serum TC, LDL-c and TG were higher and HDL-c was lower in the hypertensive patients than the healthy controls. The findings of the present study indicates that blood sampling for measuring the lipid profiles of hypertensive patients is an essential part of management.

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