Original Article

Relationship between Serum Lipid Profile and Hypertension

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Summary:

Background: Dyslipideamia is an important major risk factor for cardiovascular disease (CVD), which is the leading cause of death in the developed and developing countries. The world health organization estimates that dyslipideamia is associated with more than half of global cases of ischemic heart disease and more than 4 million deaths per year.

Objective: To assess the serum lipid profile in hypertensive patients.

Patients and methods: A case – control study was carried out at AL – Mustansyria , AL- Dubbat primary care centers for family Medicine and Medical city out patients clinic.Lipid profile were studied in 100 hypertensive patients and 100 healthy volunteers individuals attending these clinics matched for age and sex, serving as a control group. Full history was taken, complete clinical examination was done and various laboratory investigations were carried for all individuals in both groups.

Results: The mean age was (50.9±9.1)year ; (49.7±9.7)year for hypertensive and control individuals. With 50 % for males and females in both groups. The hypertensive patients had significantly higher body mass index than controls ($P=0.005$).The hypertensive patients had significantly higher total cholesterol (TC), triglycerides (TG), low density lipoprotein (LDL), and lower high density lipoprotein (HDL),(204.6±20.8, 162.7±45.2,126.0±23.0, 46.1±7.4) , than control group (176.0±11.8, 151.5± 120.8, 102.6±121.6, 56.2±7.5). In hypertensive patients the TC was significantly increasing with age, overweight, and more in males than females. The TG were slightly more in males than females. LDL had increasing value with gender and BMI. Also there is significant association between serum HDL and obesity in both hypertensive and control patients but more with hypertensive patients.

Conclusion: There is a significant relationship between dyslipideamia, B.M.I and hypertension.

Keywords: Hypertension, dyslipidemia, obesity.

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Introduction:

Hypertension has been recognized as the most common cardiovascular disorder and a leading cause of morbidity and mortality in both developed and developing countries. (1) it is one of ten leading reported causes of death with about 4% of such deaths due to hypertensive complications.(1) 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(2) Dyslipidemias: are disorders of lipoproteins metabolism, including lipoprotein overproduction or deficiency.(3) The American Heart Association estimated that more than 100 million of Americans – one third of all Americans- have total cholesterol levels in excess of 200 mg/dl , which is considered a moderately high level, and more than 34 millions adult Americans have level greater than 240 mg / dl , which is considered a high level necessitating treatment .(4) Behavioral risk factor surveillance system data showed that the cholesterol screening has increased from 67% in 1991 to 73% in 2003. Awareness of high blood cholesterol among persons screened increased from one quarter in 1991 to nearly one third in 2003.The good news on cholesterol attention and awareness is that between 1988 to 2000, the mean total cholesterol and LDL-c levels of adults actually decreased by 1% and 3% respectively.(5)PATIENTS and METHODS :Study groups: A case- control study was conducted from first of 0ctober 2010 to the first of June 2011. Serum lipid profile was measured in 100 hypertensive (HT) patients and compared with other 100 normotensive healthy volunteers matched in age & sex as a control group. Both groups were recruited randomly from outpatient clinic at Al-Mustensyria Primary Heath Care, Al-dubbat Primary Health Care centre, and Baghdad Teaching Hospital. A signed consent was taken from all individuals in both groups to be admitted in the study.the hypertensive patients were the visitors of these centers and the control group were healthy volunteers companion or other healthy visitors in these centers. 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/m2) was calculated. The blood pressure was taken on the left arm after five minutes relaxation, using a standard mercury sphygmomanometer, systolic and diastolic blood pressure corresponding to korotkoff sounds one and

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four respectively. blood sample was drawn from antecubital vein in all subjects after 12 hours fast, to determine : fasting blood sugar , total cholesterol(TC) , triglyceride(TG) , low density lipoproteins(LDL), high density lipoproteins(HDL), blood urea, serum createnine , fasting blood sugar and thyroid stimulating hormone.Inclusion criteria for patients admitted in the study include being HT for ≥ one year, with or without antihypertensive treatment. Exclusion criteria were: patients with thyroid disease, diabetes mellitus, renal diseases, oral contraceptive pills, steroids & lipid lowering, β blocker and thiazid drugs . Statistical Analysis:Statistical package for social sciences version 18(SPSS v.18), used for data input and analysis. Chi square test for independence used to test the significance of association between discrete variables. T test for two independent samples used to test the significance of difference between two normally distributed continuous samples. For testing the significance of difference in continuous dependent variables in more than two samples; if the independent variable was one , one way ANOVA was used , if two; then two way ANOVA was used. P value used for all tests was asymptotic and two sided. Findings withP value less than 0.05 were considered significant. P value is the probability of error/chance (sampling error, error because of sampling). The finding is not considered significant if the probability of error more than 5% (P>0.05), so we cannot say the finding is wrong but say not significant because still the probability of trueness is more than 90% in some instance.

Results:

The Demographic characteristics 0f 100 patients & 100 controls are: the mean age was (50.9+-9.1);(49.7+-9.7)for hypertensive and control peoples respectively and majority of hypertensive patients (67%) in the age range 40-59 years old. With (50%) for males and females in both groups. Our hypertensive patients hadB.M.I significantlyhigher than controls. (P < 0.05) The mean levels of serum lipoproteins showed statistical significant differences between patients(TC: 204.6±20.8, TG: 162.7±45.2, HDL: 46.1±7.4, LDL:126.0±23.0) and control group(TC:176.0±11.8, TG:151.5±120.8, HDL: 56.2±7.5, LDL:102.6±121.6) (P<0.0005)as shown in Table 1. a statistical significant difference was found between patients and control group in mean levels of total cholesterol by different demographic characteristics (P=001 for age) and P<0.0005 for sex, BMI, respectivelyinTable2. Also a statistical significant difference in mean T.G level between patients and control group regarding gender (P=0.044) as shown in Table 3. The mean levels of serum HDL according to study group and different demographic and clinical characteristics revealed statistical significant difference between patients and controls regarding BMI(P=0.017) while other parameters were not significant(P>0.05) as in Table 4. The mean levels of serum LDL according to study group and different demographic and clinical characteristics revealed a statistical significant difference between patients and control group regarding gender(P=0.031) and BMI(P=0.018).

Table 1: Mean levels of serum lipoportiens according to study groups:

Serum lipid profile (mg/dl)	Patients N =100	Controls N =100	P
TC (Mean±SD)	204.6 ± 20.8	176.0 ± 11.8	P<0.0005
TG(Mean±SD)	162.7 ± 45.2	151.5 ± 120.8	P<0.0005
HDL(Mean±SD)	46.1 ± 7.4	56.2 ± 7.5	P<0.0005
LDL(Mean±SD)	126.0 ± 23.0	102.6 ± 121.6	P<0.0005

N; number, P; P value, SD; standard deviation TC; total cholesterol, TG; triglycerides, HDL; High density lipoprotein, LDL: low density lipoprotein.

Table2: Mean levels of total cholesterol according to study group and different demographic and clinical characteristics

Variables	Hypertensive N	Mean	SD	Control N	Mean	SD	P
Age (year)							
30-39	111	93.8	13.5	18	176.1	13.8	0.001
40-59	67	207.3	22.0	64	175.3	11.1	
≥ 60	22	201.7	18.7	18	178.4	12.8	
Total	100	204.6	20.8	100	176.0	11.8	
Gender							
Male	50	208.3	17.5	50	174.9	13.6	P<0.0005
Female	50	205.3	23.9	50	177.1	9.9	
Total	100	204.6	20.8	100	176.0	11.8	
BMI							
Normal	5	206.2	10.5	4	168.0	8.7	P<0.0005
Over Weight	58	202.5	21.7	79	175.3	12.0	
Obese	37	207.6	20.5	17	181.6	10.3	
Total	100	204.6	20.8	100	176.0	11.8	

N; number, P; P value, SD; standard deviation, BMI; body mass index

Table 3: Mean levels of serum triglycerides according to study group and different demographic and clinical characteristics.

Variables	Hypertensive N	Hypertensive Mean	Hypertensive SD	Control N	Control Mean	Control SD	p
Age (year)							
30-39	11	168.7	71.5	18	146.5	48.5	0.054
40-59	67	166.9	42.7	64	136.7	24.4	
≥ 60	22	146.7	33.9	18	152.8	16.9	
Total	100	162.7	45.2	100	141.4	29.6	
Gender							
Male	50	164.8	55.2	50	148.4	34.0	0.044
Female	50	160.6	32.8	50	134.4	22.7	
Total	100	162.7	45.2	100	141.4	29.6	
BMI							
Normal	5	152.2	55.9	4	119.9	36.1	0.074
Over Weight	58	155.4	35.9	79	141.3	30.1	
Obese	37	175.5	54.5	17	146.6	24.8	
Total	100	162.7	45.2	100	141.4	29.6	

N; number, P; P value, SD; standard deviation, BMI; body mass inde

Table 4: Mean levels of serum HDL according to study group and different demographic and clinical characteristics

Variables	Hypertensive N	Hypertensive Mean	Hypertensive SD	Control N	Control Mean	Control SD	P
Age (year)							
30-39	11	46.5	8.6	18	56.0	10.2	0.094
40-59	67	45.9	7.5	64	55.9	7.2	
≥ 60	22	46.6	6.8	18	57.5	5.8	
Total	100	46.1	7.4	100	56.2	7.5	
Gender							
Male	50	46.1	7.6	50	56.6	6.8	0.086
Female	50	46.1	7.3	50	55.9	8.3	
Total	100	46.1	7.4	100	56.2	7.5	
BMI							
Normal	5	49.8	3.3	4	55.1	10.1	0.017
Over Weight	58	47.0	6.3	79	57.7	6.4	
Obese	37	44.3	9.0	17	49.8	9.0	
Total	100	46.1	7.4	100	56.2	7.5	

N; number, P; P value, SD; standard deviation, BMI; body mass index

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 .(6)The present study revealed a significant relationship between dyslipideamia and hypertension. The mean value of serum cholesterol, triglycerides, and LDL are significantly higher while the serum levels of HDL are significantly lower in hypertensive patients than control groups . This finding goes with previous studies, in Congolese 2005(7); Nepal 2006(8) , Bangladesh 2006(6) , Iran 2007(9) , Japan 2008(10), Turkey 2008(11) , Nigerian 2009(1) , that show an increase in the prevalence of dyslipideamia in hypertensive patients. Also in our study we evaluated the relationship between serum lipid profile and other risk factors among hypertensive patients and control.The increase in cholesterol level among hypertensive patients were found in correlation with older age group , more in males than females, severe hypertension, with increasing body weight ..Age, hypertension, and hyperchlesroleamia have multiplicative effects on CVD risk and thought to be mediated through oxidative stress and endothelial dysfunction(12) . In our study, we found a significant correlation between age and cholesterol level but not with TG, LDL, HDL in hypertensive patients and this may suggest that the cholesterol is the risk factor in those patients for CVD than other parameters of dyslipideamia. The significant association of obesity and dyslipidemia found in our study goes with previous studies(13) . Obesity is currently considered a common risk factor for many chronic diseases. Also our hypertensive patients with higher BMI show significantly higher TC, LDL levels and lower HDL levels than controls. These observations make them highly vulnerable to increasing risk of CVD and may suggest an aggressive and comprehensive treatment of associated conditions, especially dyslipideamia. The male hypertensive patients have significant higher level of TC, TG and no significant difference in HDL level than female hypertensive who in turn have slightly higher level than males. As another study reported less favorable lipid profile in men compared to women .(14) While Nigerian hypertensive females have significantly higher total cholesterol than their male counterparts.(1)This may be explained by a racial differences. Men have higher coronary heart disease risk than women, the endogenous sex hormones may be associated with coronary heart disease risk, suggesting life time exposure to estrogen reduces CVD risk in women and the lower free estradiol (E2) levels are associated with an atherogenic lipid profile.(15)

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