

**ROLE OF HYPERTENSION ON THE LIPID PROFILE OF PERSONS IN SUDAN**

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**Abstract:** This study was designed to evaluate the lipid profiles of individual with their hypertensive status as the profile is used to determine the risk of obesity, heart disease in myocardial infarction, atherosclerosis and deciding there treatment. **Materials and Methods:** 100 hypertensive patients and 100 healthy individuals who were referred to cardiology department included in study for the evaluating adverse effect. Blood pressure and serum lipids profile including total cholesterol, High-Density Lipoprotein, triglyceride and Low-Density Lipoprotein were evaluated in both the case and control group **Results:** our study shows that total cholesterol and the mean of serum LDL level were significantly higher in the hypertensive patients compared to normal individuals ( $P=0.03$ ), while the mean of serum triglyceride levels was higher in the case group compared to the control group ( $P= 0.021$ ). **Conclusion:** We concluded that the serum triglyceride, LDL, total cholesterol levels were significantly visible between the hypertensive and healthy individuals.

**Keywords:** LDL, Hypertension, Triglycerides, cholesterol

**INTRODUCTION**

Hypertension, the main cause of mortality in the world, which also caused stroke, cardiac failure, vascular disease, atrial fibrillation myocardial infarction and renal disease. In United States 60 million peoples are suffer from hypertension concluded in a study<sup>1</sup>. Ruixing demonstared in an investigation on the different genetic and environmental risk factors of hypertension that age, hyperlipidemia, alcohol consumption, high Body Mass Index (BMI), and sodium intake were adverse effect with hypertension<sup>2</sup>. Several previous studies showed the relation between hyperlipidemia and hypertension<sup>3,4</sup>. An excessive daily intake of saturated fats, cholesterol, and other sources of calories leading to hyper-cholesterolemia and hyper-triglyceridemia which are associated with obesity and consequently, hypertension<sup>5,6</sup>. Impaired insulin function<sup>7</sup>, increased peripheral resistance, cardiac output, sympathetic tone, and salt congestion were some of the responsible action which lead to hypertension.

The relation between hyperlipidemia and hypertension was shown in studies which compared the lipid profiles of hypertensive and healthy individual cases. Browne et al (2000) confirmed the association between many effect including BMI, serum cholesterol, HDL and hypertension<sup>8</sup>. Cholesterol is transported in the blood by lipoproteins which are consist of very low density lipoproteins, low density lipoproteins, and high density lipoproteins. VLDL and LDL contain a lipoprotein B100, which is recognized by the tissues while HDL does not contain. Therefore, HDL reports fully distinctive behavior and function as compared to the others that is carrying the cholesterol from tissues to the liver<sup>8</sup>, and therefore helps protect individuals against atherosclerosis. Individual reports high ratio between high density and low density lipoproteins, the probability of developing atherosclerosis is significantly reduced. Our study was designed to compare the serum triglyceride, cholesterol, HDL, and LDL levels in hypertensive and healthy individuals.

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## **MATERIALS AND METHODS**

In this case-control study, we assessed 100 hypertensive patients who were referred to cardiovascular department from June 2013 to January 2014 of age group 20 to 74 years. Blood samples were collected to analyse total cholesterol, triglyceride, HDL, and LDL levels and patients blood pressures were analysed according to the guidelines by the World Health Organization (WHO). Patients with blood pressure showing on higher side and having medications were considered as hypertensive patients while other were considered as control group. These hypertensive patients were compared with 100 healthy individuals who referred to the clinic for routine check-up. All the participants were told to sign a written consent after being given a brief of the research process. A total of 100 samples i.e. blood (in sterile sample bottles) were collected. Person need to fast for 9-12 hours before blood was drawn only water

is permitted during the period. The blood was allowed to coagulated so that the serum was extracted by centrifuging and used for biochemical analysis. Furthermore, the characteristics of individuals, including age, gender, education, marital status, occupation, smoking, weight, and past and current medical and drug history were registered in a sheet. The threshold points for LDL and cholesterol were 110 mg/dl and 200 mg/dl, respectively

## **STATISTICAL ANALYSIS**

The data were analyzed with chi-square fisher exact test using the SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). Kolmogorov–Smirnov test (K–S test) were used to checked for normality of data. t-independent and Chi-square tests were used to compare the study groups and to investigate the role of independent factors such as age, gender, education, marital status, occupation, weight, and smoking in the studied group. Numerical data were expressed as mean± SD or as proportions of the sample size. A P-value less than 0.05 was considered significant.

## **RESULTS**

**Table 1: Demographic characteristics of case and control individuals**

Demographic features		case	control
Gender	Male	56(51%)	50 (45.5.0%)
	Female	54(49%)	60 (54.5.0%)
Marital Status	Single	37(33.6%)	61 (55.4%)
	Married	73(76.4%)	49 (44.6%)
Education	Illiterate	46(41.8%)	21 (10.1%)
	educated	64(59.2%)	89(80.9%)
Occupation	Employed	81(73.6%)	56 (50.9%)
	Non-Employed	29(26.4%)	54 (49.1%)
Smoking	Positive	86(78.1%)	48 (43.6%)
	Negative	24(21.9)	62 (56.4%)

There was a significant difference between mean values of Total cholesterol among the hypertensive and healthy person. It came to our knowledge that mean value of Total cholesterol in hypertensive was high as compared to healthy person. Other demographic characteristics of case and control individuals are shown in Table 1.

**Table 2. Mean lipid profile value for case and control**

Groups	Case (N=100)	Controls (N=100)	p- value
TC (mg/dl)	234.02 ± 17.85	142.96 ± 19.32	0.030
HDL (mg/dl)	48.02± 7.58	69.18±6.04	0.040
TG (mg/dl)	217.15±21.31	55.71±17.20	0.023
VLDL(mg/dl)	41.77±2.66	34.74 ± 3.17	0.032
LDL (mg/dl)	119.10± 12.64	67.11± 11.91	0.020

Table 2. shows Serum total cholesterol was significantly higher in the hypertensive patients (234.02 mg/dl) compared to healthy subjects (142.96 mg/dl), (P = 0.030). The mean serum triglyceride levels were significantly higher in the case group compared to the control group [217.15 mg/dl vs.55.71 mg/dl, respectively, (P =0.023)]. However, there was less difference in the mean serum HDL level between the groups [48.02 mg/dl vs. 69.18 mg/dl (P = 0.04)]. The mean LDL level was effectively higher in hypertensive patients (119.10 mg/dl) compared to healthy individuals (67.11 mg/dl) (P = 0.020). After doing multivariate analysis of age, gender, education, marital status, occupation, smoking, and weight showed a visible difference in the serum triglyceride levels between the case and control group (P = 0.023). Furthermore, the difference between the two groups was significant for serum total cholesterol level (P = 0.030), HDL (P = 0.040) and LDL (P = 0.020).

### **DISCUSSION:**

This study clearly showed that the total cholesterol, LDL level and triglyceride were higher in hypertensive patients in comparison with healthy individuals. These findings were entirely matching with the results of some previous studies. Sabri<sup>9</sup> and Yin<sup>11</sup> showed that total cholesterol level was higher in hypertensive patients than non-hypertensive subjects. Li et al (2008) revealed higher triglyceride levels in hypertensive patients in China<sup>10</sup>. Our finding on LDL was similar to the results of Assmann's and Schulte's study<sup>15</sup>. However, this research showed no statistically significant difference in serum HDL level between hypertensive and healthy individuals. The logistic regression test showed that total cholesterol, serum triglyceride, LDL level was significantly visible between the case and control group.

The significance was on borderline because of demographic and other variables the analysis. By the above result we can conclude that unfavorable lipids, including cholesterol and LDL are higher in the newly diagnosed hypertensive patients. The association between hyperlipidemia and hypertension has been confirmed earlier. Hyperlipidemia as a co morbid factor increases hypertension morbidity; so, combined corrections of these disorders tend to decrease morbidity among patients. Treatment with statins is recommended in hypertensive cases with an estimated risk of cardiovascular death above five percent<sup>12</sup>. Statins may be useful in hypertensive individuals with high total cholesterol and could be used as an antihypertensive medication<sup>13</sup>. The linkage between hypercholesterolemia caused obesity and hypertension is visible. However, the direct mechanisms leading from hypercholesterolemia to hypertension are not fully understood, ketosis<sup>14</sup>. The renal tubular absorption results in primary sodium retention and increased extracellular-fluid volume in early phases of obesity,. Subsequently, plasma renin activity, angiotensinogen, angiotensin II, and aldosterone values increase significantly. By combining these facts with the results of our study, the effect of abnormal serum lipid levels was main cause of hypertension. Thus, it seems rational to correct any lipid disorder in hypertensive patients.

### **CONCLUSION:**

In comparison to healthy individuals, hypertensive had higher lipid profile. There was more problems indicated by higher values of total cholesterol, triglycerides, LDL, VLDL, and lower value of cardiac protective HDL in hypertensive person. We have also been able to prove that there is increased Lipid Profile and dyslipidemia in hypertensive person which show Heart Failure, myocardial infarction, Atherosclerosis. The observation of our study suggests that there is more risk of CVD progression of atherosclerosis in hypertensive persons.

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**Conflict of interest**

The authors declare no conflict of interest.