

## Serum Lipid Profile in Nigerian Patients with Ischaemic Cerebrovascular Accident

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**Abstract:** Ischaemic Cerebrovascular Accident (CVA) has been shown to be associated with abnormal lipid profile (dyslipidaemia) as a risk factor. There is paucity of data regarding this in this environment hence this study. In this study, a total number of 63 subjects were recruited comprised of 33 patients with cerebrovascular accident (stroke) and 30 apparently healthy volunteers as control. A complete lipid profile which included Total serum Cholesterol (TC), serum Triglyceride (TG), High Density Lipoprotein cholesterol (HDL-c) and Low Density Lipoprotein cholesterol (LDL-c) were assayed for both patients and controls. The lipid profile was determined using standard methods. The TC for both patients and control were  $212\pm 53$  and  $196\pm 46$  mg/dL respectively, TG for both patients and controls were  $159\pm 9$  and  $79\pm 13$  mg/dL respectively, HDL-c was  $55\pm 9$  mg/dL for patients and  $61\pm 7$  mg/dL for controls and LDL-c was  $151\pm 34$  mg/dL for patients and  $117\pm 51$  mg/dL for control subjects. TC, TG and LDL-c were higher in the ischaemic CVA patients than the controls; however only TG showed a significant increase while HDL-c although not significant was lower than control. The study therefore showed that ischaemic CVA is associated with hypercholesterolaemia, hypertriglyceridaemia and high LDL-cholesterol. We thus suggest preventive and management strategies that will reduce lipid levels (TC, TG and LDL) and enhance HDL-cholesterol in Nigeria patients that are prone to or diagnosed of ischaemic CVA.

**Keywords:** Cerebrovascular accident, cholesterol, high density lipoprotein, lipid profile, low density lipoprotein

### INTRODUCTION

Cerebrovascular Accident (CVA) commonly known as stroke was first described in details in the writings of Hippocrates (460-370BC). He used the term "apoplexy" which denotes the syndrome of loss of speech, paralysis of the tongue and weakness or paralysis of parts of the body and encompassed signs and symptoms similar to stroke (Garrison and McHenry, 1969). Apoplexy means "struck with violence" in Greek, a term denoting the sudden change in physical well-being experienced by stroke victims.

Stroke is defined as rapidly developing symptoms and/or signs of focal and global loss of cerebral function lasting for at least 24 h with no apparent cause other than of vascular origin (Young *et al.*, 2007). Stroke, therefore is a focal neurologic deficit of acute onset of presumed vascular origin. The definition implies a clinical event, with a focal dysfunction of the Central Nervous System (CNS), which is likely to be secondary to a disease involving the vessels and circulation. Stroke could also be defined as a clinical

syndrome of neurological disability due to destruction of brain tissues caused by blockage of a cerebral artery. This blockage can be due to thrombosis or embolism, or to haemorrhage from a ruptured artery (Grotta *et al.*, 1982; Gorelick, 1987). Stroke is the cause of one in eight deaths. Stroke makes a considerable contribution to morbidity and mortality and is one of the top four causes of death worldwide. It also constitutes a dreadful burden of disability for the patients and their relatives. Therefore, effective risk factor intervention represents the most appropriate to reduce stroke morbidity and mortality. Some risk factors such as hypertension and atrial fibrillation have been recognized as independently related to stroke occurrence, the predictive role of lipid profile has not yet been well established. Therefore, this study designed to evaluate serum lipid profile in Nigerian patients with ischaemic cerebrovascular accident.

### MATERIALS AND METHODS

**Subjects:** The study population consisted of 33 (21 males and 12 females) adult Nigerians newly diagnosed

with CVA by a Consultant Physician in the General out Patient Department (GOPD) /Medical Emergency ward of Central Hospital, Benin City, Edo State, Nigeria and 30 (19 females and 11 males) apparently healthy Nigerian volunteers as controls. The study was conducted in compliance with the Declaration on the Right of the Patient after approval by the Ethical Committee of central hospital, Benin City, Edo state, Nigeria. Also, an informed consent was obtained from all subjects/relatives as demanded enrolled for the study.

**Sample collection and analysis:** Samples were collected from all the 63 subjects recruited for this study. Five mL of venous blood using a sterile needle and syringe were collected from the antecubital vein under aseptic precaution from each subject into plain bottles. The blood was then centrifuged after clotted blood has retracted at 4000 rpm for 5 min and the serum removed and stored at 4°C pending assay for lipid profile.

Serum Triglyceride (TG) and Total Cholesterol (TC) concentrations were determined as described by Erickson *et al.* (1990), while High Density Lipoprotein Cholesterol (HDL-C) and Low Density Lipoprotein Cholesterol (LDL-C) were determined according to the method of Nicholls *et al.* (1986). Very Low Density Lipoprotein Cholesterol (VLDL-C) was calculated using the Friedewald *et al.* (1972).

**Statistical analysis:** Results were presented in mean±S.D. and in suitable tables. The paired sample t test was used to test the level of significance and p<0.05 was considered significant.

## RESULTS

A total of sixty-three samples were collected from the study population; 33 were samples from newly diagnosed ischaemic CVA patients and 30 were from apparently healthy volunteers. Total cholesterol, triglyceride, High Density Lipoprotein (HDL-c) and Low Density Lipoprotein (LDL-c) levels were determined in both stroke patients and control subjects.

The mean±S.D. of age for the CVA patients were 66±5 and 50±8 years for the controls. The mean±S.D. of TC, TG, HDL-c and LDL-c for CVA patients as compared with control subjects are shown in Table 1 below. The TC, TG and LDL-c for CVA patients were higher than the control. Only TG was significantly higher while HDL-c although not significant was lower than control. When male patients were compared with female patients; TC was seen to be higher in males than females, TG was lower in males compared with females, HDL-c was higher in males compared with females and LDL-c was lower in males compared with females though not significant (Table 2).

Table 1: Serum lipid profile in ischaemic CVA patients as compared with controls

Parameters	Patients N = 33	Controls N = 30	p-values
Total cholesterol (mg/dL)	212±53	196±46	>0.05
Triglyceride (mg/dL)	159±29	79±13	<0.05
HDL-cholesterol (mg/dL)	55±9	61±7	>0.05
LDL-cholesterol (mg/dL)	151±34	117±51	>0.05

p-value <0.05 is significant

Table 2: Serum lipid profile in males patients compared with females patients

Parameters	Males N = 21	Females N = 12	p-values
Total cholesterol (mg/dL)	221±43	197±78	>0.05
Triglyceride (mg/dL)	153±29	173±33	>0.05
HDL-cholesterol (mg/dL)	55±10	56±10	>0.05
LDL-cholesterol (mg/dL)	149±29	155±50	>0.05

p-value <0.05 is significant

## DISCUSSION

Cerebrovascular Accident (CVA) or stroke is a disease state which causes paralysis of some parts leading to the inactivation of these body parts. This paralysis, which could be Haemorrhagic or Ischaemic, could be as a result of one of its risk factor, which is lipid dysfunction, the main focus of this study.

From the laboratory investigations carried out it was evident that total cholesterol was higher in stroke patients than normal patients although not significant. This result correlates with the works of Sacks *et al.* (1999) and Sacco *et al.* (1997). Hypercholesterolaemia blocks the vascular blood flow, leading to Ischaemic stroke and the patients seen were of the Ischaemic stroke type which correlates with the study of Law *et al.* (1994) which reported that low serum cholesterol leads to Haemorrhagic stroke and not Ischaemic as the intracerebral arteries are exposed to shear stress especially in hypertensive with high diastolic pressure.

Also the serum triglyceride level was seen to be significantly higher in stroke patients than control. This result emphasizes hypertriglyceridaemia as a risk factor for stroke as there is increase in chylomicrons and very low-density lipoprotein in hypertriglyceridaemia which can lead to blockage of blood vessels, hence resulting in stroke. This is similar to the findings observed in the study of Mansoureh *et al.* (2011). Their study showed hypertriglyceridaemia as a risk factor for stroke.

Although the level of HDL-cholesterol in patients was lower than those of Control in this study, there was no statistical significant difference. HDL is known to promote the transport of extra-hepatic cholesterol back to the liver hence reducing serum cholesterol thereby preventing Ischaemic stroke. It therefore shows that, HDL cholesterol level has an inverse correlation with the risk of stroke (Qizibash *et al.*, 1992). High serum HDL-cholesterol reduces the risk of stroke while low serum HDL-cholesterol increases its risk. Although no statistical significance between serum HDL-cholesterol

levels in patients and control subjects, the lower serum HDL-cholesterol level, compared to the control subjects, is an indication of the incidence of stroke in these patients.

LDL-cholesterol is a component of Lipoprotein (a) (Lp (a)) and is found attached to a unique glycoprotein called a apolipoprotein (a) (apo (a)) (Utermann, 1989). LDL-cholesterol has been known to have the reverse function of HDL-cholesterol, helping to carry total cholesterol from the liver to the blood circulation and other body tissues. Stein and Rosenson (1989) showed in their study that plasma levels of Lp (a) were higher in subjects with stroke as compared to controls.

This correlated with this study, as the LDL cholesterol in patients was higher than controls but was not statistically significant.

### CONCLUSION

Although total cholesterol, triglyceride and LDL-cholesterol were raised in patients than control and HDL-cholesterol lower in patients than control, only triglyceride was statistically significant showing that raised serum triglyceride is a major risk factor in Nigerian stroke patients. Also there was no statistical significance between the lipid profiles in males compared to females, although more males seen in this study seen to have more stroke than females.

In conclusion, the triglyceride level of individuals should be controlled, as this is the only lipid that showed statistically significant increase in Nigerian stroke patients.

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