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Serum Lipid Profile In Ischaemic Stroke Patients in Southern Nigeria

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Abstract: *Several studies in the past failed to demonstrate the relationship between serum lipid profiles as a risk factor for stroke. Aim: To determine the relationship between lipid profile and ischaemic stroke. Methodology: A total of 100 patients were included in the study, with 50 acute ischaemic stroke patients and 50 non-stroke patients. Results: The non-stroke patients had statistically significant higher total cholesterol concentrations when compared to those with ischaemic stroke. There was no significant difference between the HDL, LDL and triglyceride concentrations of the ischemic stroke patients when compared to the control group.*

I. Introduction

Stroke is a common neurological disorder with poorer outcome in blacks. [1,2] It is the third common cause of mortality globally after coronary heart disease and cancer. [3] It also constitutes considerable burden of disability to both patients and their relatives.

Risk factors for stroke have been classified as traditional and novel; modifiable and non-modifiable. The non-modifiable factors include sex, age, race, family history, genetic and low birth weight while the modifiable traditional risk factors include hypertension, diabetes mellitus, hyperlipidemia, atrial fibrillation, smoking, obesity and carotid artery disease. Novel risk factors include hyperhomocysteinemia, hypercoagulable states and select biomarkers.[4] About 80% of stroke incidents can be reduced by lifestyle modifications. [5]

Although there is ample evidence suggesting that increased levels of total cholesterol and low levels of high density lipoprotein cholesterol (HDLc) are strong and important risk factors for coronary heart disease; observational studies have yielded inconsistent and controversial results for lipid levels and stroke.[6]

The predictive role of lipid profile in stroke is still unclear in spite of the fact that various large randomized trials of statins have established the reduction of stroke risk associated with lowering lipid levels. This might be due to other beneficial effects of statins on the reduction of stroke risk which include stabilization of atherosclerotic plaques, improvement of endothelial function, antioxidant properties, increased nitric oxide bioavailability, inhibition of inflammatory responses and immunomodulatory actions. [7]

Our study is set out to investigate the relationship between lipid profile and ischaemic stroke.

II. Methodology

This was a retrospective study conducted on acute ischemic stroke patients admitted via the Accident and Emergency department of the University of Calabar Teaching Hospital. The University of Calabar Teaching Hospital is a tertiary health institution located in Calabar, the capital of Cross River State in Southern Nigeria. The capital has a population of 371,022 based on the 2006 population census.[8] Data was retrieved from the medical records. Stroke was defined as ‘’rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 hours or longer or leading to death, with no apparent cause other than of vascular origin’’[9, 10] Inclusion criteria were patients aged 18 years and above, patients with a diagnosis of stroke confirmed with a computed tomography (CT) scan and those who had done fasting lipid profile within 48 hours. Exclusion criteria were patients under 18 years of age, those with a diagnosis of transient ischaemic attack and those on lipid lowering drugs.

The study was conducted on 100 patients with an age range of 32 to 88 years. Subjects consisted of 50 acute ischemic stroke patients and 50 control subjects with a diagnosis other than stroke. Results of the lipid profile were retrieved from the medical records of the patients. Data obtained included total cholesterol levels, low density lipoprotein (LDLc), HDL and the triglyceride levels. Results of the CT scan and carotid Doppler of the patients were also retrieved.

III. Result

There were 100 patients, comprising 50 acute ischemic stroke patients and 50 non-stroke patients (controls) who had other diseases other than stroke including peptic ulcer disease, bronchial asthma, uncontrolled hypertension and diabetes mellitus. Among the stroke patients, there were 32 males and 18 females with a male to female ratio of 1.8: 1. The mean age for the stroke patients was 60.8 ± 12.7. The age range was 33 to 86. Among the non-stroke patients there were 21 males and 29 females giving a male to female ratio of 1:1.4. The mean age for the control was 54.3 ± 10.7. The minimum age was 32 while the maximum age was 88. (Table i).

The study found that those without stroke had statistically significant higher total cholesterol concentrations (5.40 ± 1.18 mmol/L) when compared to those with ischaemic stroke (4.77 ± 1.34 mmol/L), t (98) = 2.519, p= 0.013 (CI= 0.14-1.14). There was no statistically significant difference between the HDL, LDL and triglyceride concentrations of the ischemic stroke patients when compared to the control group (table ii).

There were also no statistically significant associations between ischaemic stroke and sex (p=0.07), total cholesterol (p=0.09) and age (ie 0-45 years and those above 45 years). The p value for the association of age (≤ 45 years and >45 years) and ischaemic stroke was 0.56 which was not significant.

Twenty four of the ischaemic stroke cases abused alcohol compared to 16 in the control group. None of the control cases smoked while seven ischaemic stroke patients were smokers. Regarding hypertension as a vascular risk factor, 28 of the stroke patients were hypertensive while 26 of the controls were found to be hypertensive. Seventeen of the control cases were diabetic compared to 12 of the stroke cases. There were two cases with a past history of transient ischaemic attack (TIA) in the ischaemic stroke group and none in the control group. Three patients in the ischaemic stroke group had insignificant carotid stenosis. (See Table iii).

Table i- Demographic data of stroke cases and controls

Variable	controls	Ischaemic stroke	Total
No of cases	50	50	100
Males	21	32	
Females	29	18	
Mean age(years)	54.3 ± 10.7	60.8 ± 12.7	
Age range(years)	32-88	33-86	

Table ii- lipid profile in ischaemic stroke cases and controls

	Controls		**Ischaemic stroke**				
Parameter	Mean	Std. deviation	Mean	Std. deviation	t(98)	p	Confidence Interval
Total cholesterol	5.40	1.18	4.77	1.34	2.519	0.013	0.14-1.14
HDL	1.65	0.38	1.43	0.84	1.681	0.096	-0.04-0.48
LDL	3.14	1.10	3.05	1.22	0.400	0.690	-0.37-0.55
Triglycerides	1.36	0.50	1.30	1.08	0.368	0.713	-0.27-0.40

Table iii- Vascular risk factors among stroke patients and controls

Parameter	**Stroke patients**	**control**
Alcohol	24	16
Tobacco	7	0
Hypertension	28	26
Diabetes mellitus	12	17
TIA	2	0
Carotid stenosis	3	Carotid Doppler not done

IV. Discussion

Ischemic stroke is the commonest type of stroke worldwide, occurring in over 80% of the stroke cases. [11] There is a distinct epidemiological association between serum cholesterol levels and the risk of coronary heart disease. Nevertheless, similar studies in stroke have been less convincing. [12, 13] Various clinical trials demonstrated a link between high concentrations of serum cholesterol and ischemic stroke[14, 15], while some case-control studies of stroke which analyzed cholesterol as a risk factor yielded negative findings. Togha et al[16] found a significant association between cholesterol and ischemic stroke when compared with controls. An increased level of both the total cholesterol and LDL was reported to be associated with higher risk of developing ischemic stroke. The Framingham Heart Study found no relationship between total cholesterol or HDLc serum levels and cerebral infarction. [17] This aligned with our study, where no statistically significant association was found between ischemic stroke and total cholesterol level (p=0.09) or the HDLc serum levels.

Data on the association between serum TG and stroke have been inconsistent. While some studies found an association between triglyceride and ischemic stroke, [18, 19], others reported no such association. [20, 21, 22] Serum triglyceride was reported not to play a significant role in the development of ischemic stroke. In our study, no significant difference was found between serum triglyceride levels of the ischemic stroke patients when compared with the control group. This was at variance to previous studies that observed an association between triglyceride and stroke. [19] In a 9-year follow-up of risk factors for ischaemic stroke in a population based study, Fahimfar et al[23] failed to demonstrate any relationship between high TG, low HDL and hypercholesterolemia with stroke events. The inconsistency and lack of detectable link between cholesterol and stroke has been attributed to the heterogeneity of stroke since dyslipidemia plays a non-significant role in the pathogenesis of some ischemic stroke sub-types such as lacunar and cardio- embolic strokes.[24]

V. Conclusion

The risk factor of stroke is multi-factorial. The predictive role of lipid profile as a stroke risk factor remains controversial as our study failed to demonstrate the association between lipid profile and stroke.

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