

Blood lipid profile study in patients with acute stroke

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Summary

Background: The accumulation of the lipid in the vascular smooth muscle cell within the arterial intima is a key process of the pathogenesis of atherosclerosis. Atherosclerosis is a degenerative disease of blood vessels leading to stroke.

Materials & Methods: One hundred and ten patients with acute stroke were included in this study (88 patients with ischaemic or infarction stroke and 22 patients with hemorrhagic type) as well as thirty apparently normal healthy subjects as controls.

Results: Triglycerides levels and AI only were statistically significant in ischaemic type of stroke ($P < 0.005$) while other lipid fractions were similar to the control values.

Conclusion: Acute stroke patients (infarction type) had significantly elevated TG and low AI. While those with hemorrhagic type had more or less similar lipid profile to normal control. In general the higher the TG level the poorer the outcome in patients with acute stroke.

**J Fac Med Baghdad
2005; vol.47 No. 1**

Received: Oct 2004

Accepted: Dec 2004

Introduction

The role of blood lipids has evolved rapidly since the 1950 when is preoccupation with natural fat (triglycerides) and the serum total cholesterol⁽¹⁾.

Atherosclerosis is a complex disease involving focal changes in the arterial intima that include proliferation of vascular smooth muscle cells, accumulation of macrophages, infiltration of blood and blood constituents and accumulation of lipids. The lipids can be found within the extracellular space of the arterial intima or within cholesteryl ester-rich foam cells^(2,3).

The basic lesion of atherosclerosis is the fibrous plaque, which consists of lipids, smooth muscle cells, macrophages and connective tissue matrix⁽⁴⁾.

Chief advances in the field of lipid metabolism and its relationship to atherosclerotic cardiovascular disease have been achieved during the last half-century. Epidemiological studies have defined lipid disorders as highly significant

independent risk factors for coronary heart disease along with diabetes mellitus, hypertension and smoking⁽⁴⁾.

To elucidate the relationship between blood lipid levels and cerebrovascular disease, it was suggested that disturbance of blood lipid metabolism is a risk factor for cerebral infarction⁽⁵⁾.

Accumulation of esterified cholesterol is a major metabolic change in the atherosclerotic lesion. Many clinical studies have shown that reduction in plasma cholesterol may lower the incidence of coronary heart disease through lowering esterified cholesterol in the atherosclerotic lesion^(1,6), these studies associated positively with thrombotic strokes and negatively with hemorrhagic strokes⁽⁷⁾.

Also low density (LDL) subfractions are associated with carotid atherosclerosis and may be a modifiable risk factor for stroke as well as ischemic heart disease⁽⁸⁾.

While a low HDL-cholesterol frequently occurs in conjunction with a rise LDL-cholesterol and is a risk factor for coronary heart disease⁽⁹⁾.

The epidemiological studies of individual cases do not strongly imply causality with exception of the observation that atheroma plaques contain TG⁽¹⁰⁾, other studies showed that the association is unlikely to be artificial but does not permit the conclusion that TG is a cause of stroke⁽¹¹⁾.

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Patients and Methods

Fifty-seven women and 53 men ranging in age from (20-85) years with a mean value \pm S.D. of 61 \pm 11 years were studied . The diagnosis of an acute stroke event can be based on the clinical and CT-scan findings .

Samples About 3 ml of venous blood was with drawn , using disposable needles and syringes . Transferred into plastic tube which was allowed to clot for 20-30 minutes at room temperature and the serum was recovered by centrifugation at 300 rpm , this serum was kept at (-20 °C) . Thirty apparently normal individuals were included in this study [19 females, and 11 males] . Their age ranged between 25-73 years with an average of 48 \pm 11 years. Serum cholesterol , TG ,HDL and LDL were determined by enzymatic method supplied by Bio Merieux Company , France .

Results

The results of lipid profile in acute stroke patients are summarized in table 1 and showed that the mean value of lipid profile was non significant (P > 0.05) in comparison with control subjects , except the triglycerides level(TG) significantly increased (P<0.05) and (LDL- C/HDL-C)ratio was statistically near significance (P= 0.05) . These results were applied for infarction group (table 2),while those with hemorrhagic type showed no statistical differences in comparison with control subjects (figures 1 & 2).

Table (1)

Lipid profile level in acute stroke patients and control subjects.

Lipid profile	Stroke patients (n = 110) X \pm SEM	Control subjects (n = 30) X \pm SEM
TC(mg/dL)	226.24 \pm 26.52	178.93 \pm 7.37
HDL-C(mg/dL)	37.64 \pm 1.11	50.87 \pm 12.24
LDL-C(mg/dL)	199.59 \pm 7.65	162.98 \pm 7.60
TG(mg/dL)	193.36 \pm 14.79*	108.33 \pm 10.09
TC/HDL-C	6.47 \pm 0.51	4.81 \pm 0.35
LDL-C/HDL-C	6.04 \pm 0.36 ^a	4.45 \pm 0.36

ANOVA :Groups vs Normal Controls : *P < 0.05 , ^a Near significance P=0.05

Table (2)

Lipid profile level in ischaemic stroke (infarction) patients, hemorrhagic stroke patients , and control subjects .

Lipid profile	Ischaemic stroke (n = 88) X \pm SEM	Hemorrhagic stroke (n = 22) X \pm SEM	Control subjects (n = 30) X \pm SEM
TC(mg/dL)	234.57 \pm 32.91	192.90 \pm 14.85	178.93 \pm 7.36
HDL-C(mg/dL)	137.72 \pm 1.28	37.33 \pm 8.04	50.87 \pm 12.24
LDL-C(mg/dL)	201.51 \pm 8.63* ^a	191.94 \pm 16.75	162.98 \pm 7.60
TG(mg/dL)	196.29 \pm 17.51* [*]	181.67 \pm 24.12	108.33 \pm 10.09
TC/HDL-C	6.71 \pm 0.63	5.53 \pm 0.51	4.81 \pm 0.35
LDL-C/HDL-C	6.16 \pm 0.43*	5.52 \pm 0.54	4.45 \pm 2.00

ANOVA: Groups vs Normal Controls : *P < 0.05 , **P < 0.005 , ^a Near significance

The prognosis of 13 patients with obvious high levels of both (AI) and (TG) were poor , while the prognosis of the other 37 patients with low levels of (AI) and (TG) was good . Yet these results were statistically significant when compared to their respective mean values of the control group (table 3).

Table (3)

Atherogenic index (AI) and Triglycerides (TG) in association with hospital outcome^a.

Hospital outcome	Prognosis degree	No. of patients	LDL-C/HDL-C (AI) X \pm SEM	TG(mg/dl) X \pm SEM
Death	Poor	13	7.05 \pm 1.31	234.75 \pm 6.68
No Improvement	Mild	9	6.61 \pm 1.17	219.48 \pm 4.73
Improve with disability	Moderate	51	5.42 \pm 0.44	203.23 \pm 22.34
Recover	Good	37	4.56 \pm 1.37	172.24 \pm 26.40

^a Within Patients Groups ANOVA : Not significance

Discussion

The patients in acute period of cerebral stroke have no statistically significant increase in lipid fractions (12), while other studies show that TG was significantly greater in patients with cerebral infarction (because it is a disease of the small vessels, and those who have lacunar infarcts the levels of TG HDL-C, LDL-C, and VLDL-C were more or less similar to control, and this is in agreement with the present results (tables 1 & 2).

Stroke center at Jefferson Medical College in Philadelphia pointed out that the large vessels atherosclerosis was related to elevated TC and small vessels cerebrovascular disease was connected to and elevated TG (13).

The absence of a consistent significant relationship between cholesterol and stroke may be partially explained by the recognition that not all multiple stroke subtypes are attributable to atherosclerosis (14). Clarification of the relationship between blood lipid fractions and ischaemic stroke will require examination of the effect of various blood lipids in particular atherosclerotic stroke subtype.

Hypertriglyceridaemia is emerging as a similar risk factor and it is therefore of concern that elevations of (TC, TG) either both or one of these lipid fractions was observed in a significant numbers of patients. In regard to AI (LDL-C/HDL-C) values obtained in the present study clearly demonstrate significantly elevated value (table 1). These findings agree with the previous study that showed similar results (15). While other studies disagreed with the present results about lipid fraction, that all lipid fractions (except HDL-C) levels were statistically significantly increased (16) and it is related with H.T. which is coexisted with hyperlipidemia. other study suggested that serum lipids remain stable following acute ischemic stroke, and is consistent with the absence of acute phase response or nutritional deficiency (17). Most of the patients in this study are diabetic, that explain the presence of dyslipidemia which is common in this illness as diabetes affect enzymes and pathways of lipid metabolism (17,18).

In conclusion acute stroke patients (infarction type) had significantly elevated TG and low AI. While those with hemorrhagic type had more or less similar lipid profile to normal control. In general the higher the TG level the poorer the outcome in patients with acute stroke.

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