

## Comparative Study of Lipid Abnormality in Ischemic and Haemorrhagic Stroke in Tribal Population of west Bengal

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### Abstract

**Objective:** To study lipid abnormality in stroke patients in tribal population of West Bengal

**Methods:** This observational cross-sectional study evaluated 100 stroke patients in 40-90 years age group. A thorough history and clinical evaluation was done in each patient as also necessary investigations were conducted meticulously among patients admitted in Medicine ward of a peripheral state medical hospital. Lipid profile was assessed in all participants along with neuroimaging to classify the stroke.

**Results :** Out of 100 patients 26 patients had dyslipidemia (7 in hemorrhagic & 19 in ischemic stroke patients). Dyslipidemia is associated with both types of stroke . However hyper cholesterolemia is significantly more associated with ischemic CVA. Low HDL – cholesterol is also significantly more prevalent in ischemic CVA group in our study.

**Conclusions:** Findings suggested that ischemic stroke patients had higher serum total cholesterol and lower HDL- cholesterol levels in comparison to haemorrhagic stroke .

**Keywords:** stroke, dyslipidemia, cholesterol, LDL & HDL-cholesterol

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### I. Introduction

Stroke is the rapidly developing loss of brain function(s) due to disturbance in the blood supply to the brain. This can be due to ischemia (lack of blood supply) caused by thrombosis or embolism or due to a hemorrhage. As a result, the affected area of the brain is unable to function, leading to inability to move one or more limbs on one side of the body, inability to understand or formulate speech, or inability to see one side of the visual field. In the past, stroke was referred to as cerebrovascular accident or CVA, but the term "stroke" is now preferred. After coronary heart disease and all cancers, stroke is the third most common cause of death worldwide and this causes 10-12% death worldwide[1]

Hyperlipidemia is an important modifiable risk factor of stroke. Among serum lipids, cholesterol and LDL are found to have higher values than triglycerides in the pathogenesis of atherosclerosis. However, this relationship is less certain as far as stroke is concerned. The conclusions from the MRFIT Trial[2] have established an inverse relation between serum cholesterol and risk death from hemorrhagic stroke. In contrast to this, the deaths from thrombotic stroke and cardiovascular diseases were directly related. It was seen that alterations in lipid profile are induced by both types of strokes in acute stage particularly in the infarction group[3]. Total serum cholesterol, LDL and triglycerides were significantly higher on day one as compared to control[4].

Hyperlipidemia is not as well established as risk factors for first or recurrent stroke in contrast to what seen in cardiac diseases[5,6]. Several clinical trials showed an association between high concentration of serum cholesterol and ischemic stroke[7]. On the other hand, case control studies of stroke which examined cholesterol as a risk factor have generally produced negative findings and prospective studies have failed to show a direct and strong-association. Some demonstrated an inverse relation between total cholesterol death from haemorrhagic stroke[8]. Therefore, the association between cholesterol and stroke may not be as straight forward as for coronary heart ds. Serum lipid levels have an established effect on short term mortality due to strokes[9]. It is important to evaluate the difference in serum lipid levels in subtypes of strokes to guide lipid lowering therapy which can reduce incidence of stroke and related mortality by adapting primary and secondary preventive measure[10]. Therefore, the present study was designated to know to determine the prevalence of dyslipidemia in CVA pt and to determine difference between serum lipid profile in pt's with ischemic and haemorrhagic stroke (if any) during one year period, 100 stroke-patients ( 50 ischemic & 50 hemorrhagic stroke ) admitted in Medicine ward, B.S.M.C & H, Bankura have been subjected to thorough history and clinical examination, blood examinations and imaging studies.

## II. Materials & Methods

A cross sectional observational study was conducted from may 2013 to may 2014 in the medicine indoor of Bankura sammilani medical college ,west Bengal. 100 stroke patients were selected randomly 50 from each of the hemorrhagic & ischemic group. The nature of the study was explained to each patient and/or patient's fellow(s) and an informed consent was taken from all. A thorough history and clinical evaluation was done in each patient as also necessary investigations were conducted meticulously. The patient will be included in the study according to following criteria:---

**(A) Inclusion Criteria:** A case was defined as any patient who fulfills the WHO definition of stroke between the age group of (40-90) years of age , attending indoor of BSMC & H with clinical features suggestive of non-cardiogenic ischemic stroke or hemorrhagic stroke as follows :

- 1] Diagnostic criteria for ischemic stroke both clinically and radiologically.
- 2] Diagnostic criteria for hemorrhagic stroke both clinically and radiologically.

**(B) exclusion criteria :**

- 1] Head trauma, stroke in post surgical period.
- 2] Brain tumour ,disseminated cancer ,metastatic brain tumour & pt on radiotherapy/chemotherapy.
- 3] Sepsis, viral encephalitis, T.B.
- 4] Disseminated intravascular coagulation.
- 5] Stroke related to hyperviscosity.
- 6] Hypercoagulable state like nephrotic syn. Antiphospholipid antibody syn., Protein-c & Protein-s deficiency., anti thrombin-III deficiency.
- 7] HIV, CKD, CLD, Critically ill pt due to other ds.
- 8] Connective tissue disease.
- 9] TIA.
- 10] Pt is on lipid lowering agent like statin.
- 11] Cardio-embolic stroke.

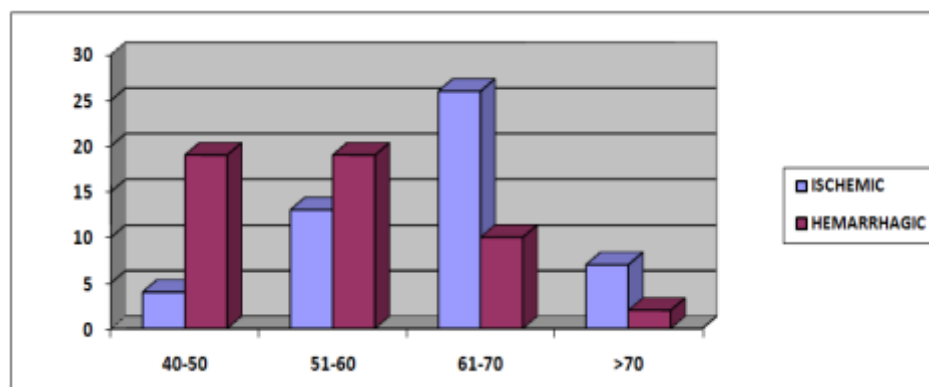
Hypercholesterolemia was defined as fasting cholesterol level  $\geq 200$  mg % done within 24 hrs of admission; hypertriglyceridemia as fasting triglyceride level  $\geq 160$  mg %, high LDL- cholesterol as  $\geq 130$ mg%, high VLDL cholesterol as  $\geq 100$  mg % and low HDL- cholesterol as  $\leq 40$  mg%.

We have used descriptive statistics for mean and standard deviation, ANOVA and unpaired T-test for numerical data and Chi-square (where applicable) and Fisher's Exact Test for categorical or nominal data. Commercially available standard statistical software was used for statistical analysis

## III. Results

The study comprises of total 100 (50 ischemic & 50 hemorrhagic) stroke cases of (40-90)years ages . All the patients were subjected to detailed history taking, Clinical examinations and different investigations. Collected data were analyzed using suitable statistical method. Patients were analyzed according to age showing highest age of the stroke is between (61-70)years & it is approx. 36 %.

❖ **Comparison of the age of the patient with Ischemic and Hemorrhagic stroke.**



❖ *Comparison of average age of ischemic and hemorrhagic stroke .*

<b>Ct-Brain Finding</b>	<b>No. Of Patient</b>	<b>Mean-Age (Year)</b>	<b>S.D.</b>
Ischemic	50	62.56	7.70
Hemorrhage	50	52.12	8.66
Total	100	58.13	9.29

- *The mean age of hemorrhagic stroke patients was 52.12±8.66 years and that of ischemic stroke patient 62.56±7.70 years.*

❖ **Sex:**

Among the 100 strokes patients, 60 were male (ischemic 31 and hemorrhagic 29), 40 were female (ischemic 19 and hemorrhagic 21). There is also increased preponderance of male affected with stroke in both ischemic and hemorrhagic stroke.

❖ **Comparison of lipid profile between ischemic and hemorrhagic stroke.**

<b>Lipid Profile</b>	<b>Ischemic Stroke</b>	<b>Hemorrhagic Stroke</b>
Total Cholesterol(<200) Mg/Dl	190±40	140 ±30
Triglyceride(<150) Mg/Dl	140±30	130±30
Ldl-Cholesterol(<130) Mg/Dl	120±40	100±40
Hdl-Cholesterol(>40) Mg/Dl	42±12	50±15

❖ **Dyslipidemia in stroke patients:**

26 Patients had dyslipidemia (7 in hemorrhagic and 19 in ischemic stroke patients). So, dyslipidemia is more common in ischemic than hemorrhagic stroke patients.

<b>Lipid Profile</b>	<b>Ischemic Cva</b>	<b>Hemorrhagic Cva</b>	<b>P-Value</b>
Total Cholesterol	10 (20%)	3 (6%)	.003
Triglyceride	2(4%)	2(4%)	1.00
Ldl-Cholesterol	4(8%)	3(6%)	.20
Hdl-Cholesterol	8(16%)	2(4%)	.004

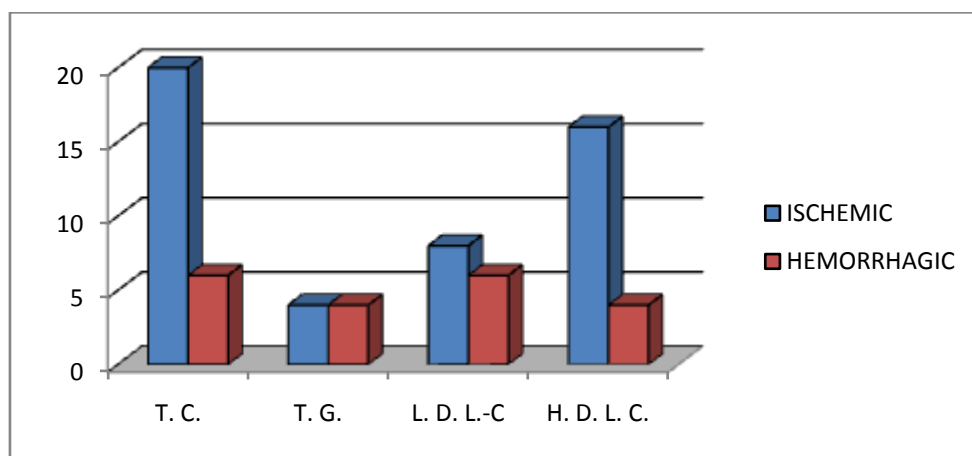
It was noted in our study that fasting serum lipid profile analysis of 50 ischemic stroke patients revealed raised serum total cholesterol in 10 (20%) patients with mean serum cholesterol of 190±40 mg/dl where as only 3 (6%) patients among 50 hemorrhagic CVA showing raised serum cholesterol with over all mean of 140±30mg/dl. So there is significant difference between two groups with p value 0.003.(<0.05)

Serum HDL was found to be low in 8 patients i.e. 16% of Ischemic stroke with mean value of 42±12 mg/dl whereas only 2 patient i.e. 4% of Hemorrhagic stroke patients showing low serum HDL with mean value of 50±15mg/dl. There is significant difference between 2 groups.

Abnormal serum triglyceride level was found to be distributed similarly in Ischemic & Hemorrhagic stroke with mean value of 140±30mg/dl & 130±30mg/dl respectively.

High serum LDL was found in 8% & 6% of ischemic & hemorrhagic stroke with mean value of 120±40 mg/dl & 100±40 mg/dl respectively.

**Comparison Of Lipid Profile Between Ischemic Stroke & Hemorrhagic Stoke**



Age in Years	T.C(mg/dl)		T.G(mg/dl)		LDL(mg/dl)		HDL(mg/dl)	
	Ischemic	Hemorrhagic	Ischemic	Hemorrhagic	Ischemic	Hemorrhagic	Ischemic	Hemorrhagic
40-50	172±38	126±34	126±24	116±28	106±32	82±28	48±16	56±18
51-60	180±36	134±32	136±28	124±26	118±30	94±36	45±12	53±15
61-70	193±35	144±28	145±24	133±27	125±37	107±39	39±15	48±14
>70	196±34	147±31	146±25	135±29	128±33	110±35	36±16	40±16

Mean plasma levels of different lipids in different age group of stroke patients. This table shows that total cholesterol significantly higher and total HDL cholesterol significantly lower in ischemic stroke than to hemorrhagic stroke with same age distribution .

#### IV. Discussion

This study is an observational & cross sectional study to across the base line lipid profile in stroke patients. To determine whether lipid abnormality is an important risk factor for stroke or not to evaluate the difference of impact of dyslipidemia in ischemic & hemorrhagic stroke. In this study ,a total 100 stroke patients ( 50 Hemorrhagic + 50 Ischemic ) were enrolled. They were then thoroughly examined & investigated properly.

Conflicting results exit in the literture about the correlation between the total plasma cholesterol of patients and the risk of stroke. “Qizilbash et al” in a review of 10 studies examining the relationship between serum total cholesterol and subsequent stroke concluded that there was a significant association however , other studies were less conclusive [11].In addition [12] we have found four case and control studies carried out in china, which obtained similar results : CI patients had significantly higher levels of total cholesterol , LDL , and triglycerides than those in control groups . Furthermore, CH subjects exhibits significantly lower levels of total cholesterol and LDL. In our study Dyslipidemia is associated with both types of stroke . However hyper cholesterolemia is a significantly more associated with ischemic CVA. Low HDL – cholesterol is also significantly more prevalent in ischemic CVA group in our study. This result is similar to “Framingham Heart Study” , “Copenhagen City Heart Study” And “Heymann And Feldman Study”. Hyperlipidemia was present in 16 % patients of stroke and was the 3<sup>rd</sup> most common risk factor for stroke in the study by “Khan et al[7]”, while the present study showed hyperlipidemia in 26% (19 pt of ischemic +7 pt of hemorrhagic ) of all 100 patients of stroke. This variation due to--This is a Hospital and indoor based study , so the data may not represent the whole population. Hospital admission depends upon severity of stroke,availability of transport, and availability of hospital bed. Sample size is also small ,50 in each group, so there is defferance of prevalence from general population.

Earlier studies showed a positive relation between serum cholesterol and non hemorrhagic stroke with an inverse association to intracranial heamorrhage . The present study also showed a positive association with ischemic stroke while , no association was seen with hemorrhagic stroke. Association between concentrations of serum triglycerides and the risk of stroke is also over shadowed. Some studies led to negative results whereas others showed a positive association with high serum triglyceride concentration . IN “Copenhagen city heart study” and “Garg et al[3]” showed a long linear association between serum triglyceride concentrations and non haemorrhagic stroke while no association was found of high plasma triglyceride concentration as a risk factor for both types of stroke in this study. This variation due to Tribal population of Purulia and Bankura are hard working and there is absence of sedentary habit in these population. Also there is plenty of fibre,vegetable and relatively less lipid in their food habit. There is an inverse association between HDL – cholesterol and ischemic stroke in the present study as 8 (16%) patients of ischemic stroke had below than normal serum HDL – cholesterol. However IN “FRAMINGHAM HEART STUDY” and “LEPPALE ET

AL<sup>13</sup> has been observed that serum HDL – cholesterol levels decrease significantly at the time of acute ischemic stroke and it may be an acute phase reactant or nascent biomarker of acute stroke susceptibility. A positive relation between high serum LDL – cholesterol levels and the risk of ischemic stroke has been seen IN “Framingham Study”, “Copenhagen City Heart Study” And “Agarwal Et Al<sup>4</sup>” . The “US women’s pooling project” found a 25 % increased risk of total ischemic stroke for each 1 mmol/L increase in total cholesterol in women (40-64) yrs. However no such association was seen in this study. This variation due to the fact that tribal population of Purulia and Bankura are hard working and there is absence of sedentary habit in these population. Also there is plenty of fibre, vegetable and relatively less lipid in their food habit. Sample size is also small 50 in each group, so there is difference of prevalence from general population. Though we have observed some important observations , a more definite conclusion regarding the behavior of stroke in community could be achieved if a large multi – centered population base study was undertaken.

## **VI. Conclusion**

We conclude that ischemic stroke patients had higher serum total cholesterol and lower HDL-cholesterol levels in comparison to haemorrhagic stroke. High risk patients of stroke may screen using serum lipid profile and further studies are suggested to evaluate the effect of lipid lowering therapy in terms of morbidity and mortality in ischemic stroke patients.

**Conflict of interest-None**

**Funding-None**

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