ORIGINAL RESEARCH PAPER

A STUDY OF SERUM LDL CHOLESTEROL IN RELATION TO SEVERITY OF ISCHAEMIC CEREBROVASCULAR ACCIDENT

General Medicine

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ABSTRACT

Background: Cerebrovascular disease is a major public health problem with significant mortalities and morbidities. Cerebrovascular diseases include some of the most common and devastating disorders: ischemic & hemorrhagic strokes. The incidence of cerebrovascular accident increases with age and the number is projected to increase as the elderly population grows, with a doubling in stroke death in United States by 2030. Ischemic stroke is caused by vascular occlusion, which may be due to emboli or thrombus. Ischemic stroke is responsible for 50-85% of all strokes worldwide1. Distribution of risk factors and their influence on ischemic stroke may vary depending upon the geographical area and cultural background. In our centre Gauhati Medical College and Hospital, a tertiary care hospital where patients from different corners of the state are referred, is representative of different ethnic, social and cultural background. There is paucity of data regarding this topic in our region. Therefore, we have taken up this study to look for spectrum of lipid profile abnormalities, specifically serum LDL cholesterol, in acute ischemic stroke. **Aim:** To study severity of ischemic stroke in relation to serum LDL cholesterol. **Methods And Materials:** This hospital based observational study recruited 150 patients of age more than 18 years admitted under Medicine, Neurology and Emergency departments of GMCH with ischemic stroke from 1stJune 2020 to 31st May 2021. **Results:** Out of 150 patients, severity of stroke is more in patients whose serum LDL Cholesterol is high. It has shown that minor stroke seen in patients with normal LDL level, (HIGH LDL=0, NORMAL LDL=8), Moderate stroke seen in NORMAL LDL=82 and HIGH LDL=51 patients & moderate to severe stroke seen in patients with only HIGH LDL cholesterol NORMAL LDL=0 and HIGH LDL=9. The relation between severity of stroke & raised S. LDL cholesterol is found to be significant with p Value of 0.001. **Conclusion:** Our study showed a definite positive correlation between Serum LDL cholesterol abnormality and ischemic stroke.

INTRODUCTION

Cerebrovascular disease is a major public health problem with significant mortalities and morbidities. Cerebrovascular diseases include some of the most common and devastating disorders: ischemic stroke, hemorrhagic stroke and cerebrovascular anomalies such as intracranial aneurysms and arteriovenous malformation. The incidence of cerebrovascular accident increases with age and the number is projected to increase as the elderly population grows, with a doubling in stroke death in United States by 2030[2]. STROKE is the second most common cause of death and the third leading cause of disability world-wide. Nearly twenty million people every year will suffer from stroke and of those people, five million will die. 85.5% of total stroke death occurs in developing countries[3]. The morbidity of stroke in developing countries is approximately seven times then that in developed countries. Recent studies identified that 0.9-4.5% of medical and 9.2 -30% of neurological admissions in India were mainly due to cerebrovascular accident. The case fatality rate of stroke during the time of hospital discharge is 9% and at the end of one month, fatality rate increases up to 20%[4].

WHO clinically defines stroke as "the rapid development of clinical signs and symptoms of a focal neurological disturbance lasting more than 24 hours or leading to death with no apparent cause other than vascular origin"[11].

An ischemic stroke is caused by loss of blood supply to the brain. This cuts off the oxygen and glucose supply causing irreversible damage to the tissues of brain parenchyma. Ischemic stroke is caused by occlusion which may be due to emboli or thrombus. Ischemic stroke is responsible for 50-85% of all strokes worldwide[1].

Distribution of risk factors and their influence on ischemic stroke may vary depending upon the geographical area and cultural background. In our centre Gauhati Medical College and Hospital, a tertiary care hospital where patients from different corners of state are referred, well represents various patients belonging to the different ethnic, social and cultural background. There is paucity of data regarding this topic in our region. Therefore, we have taken up this study to look for lipid profile abnormalities, specifically serum LDL cholesterol, in acute ischemic stroke.

AIMS AND OBJECTIVES

1) To note clinical profile of ischemic stroke patients.
2) To study lipid profile abnormalities in ischemic stroke patients.
3) To study severity of ischemic stroke in relation to serum LDL cholesterol.

MATERIALS AND METHODS

1) Study design: A hospital based observational study.
2) Study population and location: 150 patients admitted under Medicine, Neurology and Emergency departments of GMCH with ischemic stroke were taken up for analysis.
3) Study period: 1st June 2020 to 31st May 2021
4) Sample size: 150.
5) Ethical clearance was taken from Institutional Ethical Committee

Inclusion Criteria

Abrupt onset of focal neurological deficit or gradual onset with smooth or stuttering progression over few hours; CT scan brain suggesting infarction, and age more than 18 years.

Exclusion Criteria

Cerebral infarction associated with pregnancy, puerperium, dehydration, hematological disturbances, infection, patients who are on lipid lowering drugs, cardioembolic stroke, cerebral venous thrombosis, past history of stroke, hemorrhagic stroke.

Data Collection
After obtaining informed consent; detailed history, clinical examination and laboratory investigation reports were entered in the proforma designed for this study.

Laboratory Investigation
CBC with ESR, HbA1c, FBS, PPBS, fasting lipid profile, PT with INR, aPTT, TSH, LFT, RFT, CRP, NCCT brain, ECG, Echocardiography as per need on case-to-case basis.

RESULTS
Between 1st June 2021 & 31st May 2022, 150 patients with ischemic stroke admitted in Gauhati Medical College & Hospital were studied.

The male to female ratio was 2.6:1(N=150, Male-108, Female-42). Out of which 26%(N=39) were less than 45 years. In our study the mean age is 57.72+/-14.38.

Lipid Profile Parameters In Patients With Ischemic Stroke:
Table 1 shows the prevalence of lipid profile abnormalities. We note that low HDL was more prevalent in female than in male while total cholesterol was higher in males than females, we also found that the lipid profile abnormalities in male and female are different. This is shown in the table-8.

Table-1 shows Lipid Profile in stroke patients:

Age	Dyslipidemia	Hypercholesterolemia	Hypertriglyceridemia	High LDL	Low HDL
30-45	18	13	15	13	13
46-60	25	19	19	23	16
61-75	14	8	12	15	14
>75	6	3	8	9	3

Association of LDL CHOLESTEROL and GCS:
All the patients with severely low GCS had high LDL, out of 79 patients with moderately low GCS, 43 had normal LDL and 36 had high LDL. Among 52 patients with mild decrease in GCS, 47 had normal LDL, whereas only 5 patients had high LDL. The relation between severity of GCS and serum LDL Cholestesterol has been found to be significant with p value 0.001.

Table-2 shows association of LDL CHOLESTEROL and GCS:

GCS	LDL Normal	LDL High	Total
<7 severe	0	19	19
moderate7-10	43	36	79
>10 mild	47	5	52
Total	90	60	150
Chi Square	49.52		
P-value	0.001		

Severity of ischemic stroke:
Among all 9 patients with moderate to severe NIHSS had recorded high LDL. Among 150 patients, those with moderate decrease in GCS, 82 had normal LDL, whereas 51 had LDL; however, all the patients with minor NIHSS had normal LDL. Therefore, patients with severe NIHSS had significantly raised LDL. The relation between severely of stroke & raised serum LDL is found to be significant with p value 0.001.

Table-3 shows association of LDL CHOLESTEROL and NIHS score:

NIHSS	LDL Normal	LDL High	Total
1-4 minor	8	0	8
5-15 moderate	82	51	133
16-20 mod to severe	0	9	9
Total	90	60	150
Chi Square	18.98		
P-value	0.001		

DISCUSSION

Stroke is a major public health problem which has significant morbidities and mortalities. Worldwide, it is the second most common cause of death in adults. Stroke occurs predominantly in males at late years of life. Several studies documented that systemic hypertension, diabetes mellitus, obesity, hyperlipidemia, ischemic heart disease, atrial fibrillation, smoking and longstanding alcohol intake are contributing factors for stroke. The prevalence of risk factors varies in different population. Despite numerous prior studies of stroke, many risk factors remain unknown and several inconsistencies continue to exist.

Dyslipidemia In Ischemic Stroke:
In our study, we observed that dyslipidemia is present in 42% of the patients. In a study done in Egypt by Osama AK et al. in 2013, dyslipidemia is present in 57.1%.In Pakistan, Khan et al. found prevalence of dyslipidemia to be 32.7%.Dyslipidemia is one of the three most common risk factors for ischemic stroke in those two studies. In India, Cynthia A, et al. 2014 reported that among their ischemic stroke patients 56% had dyslipidemia. Also, a study from Switzerland found hypercholesterolemia in 55% of patients with ischemic stroke[7].

In our study, the patterns of dyslipidemia showed a high TC 28%, high LDL 24%, TG 36% and low HDL 30%. When this data was compared with data obtained from other studies, surprisingly it showed a rather lower level of LDL than is usually implicated in atherosclerosis. Low level of HDL and high level of triglycerides are associated with a doubling of the risk of stroke mortality and morbidity. High titre of LDL cholesterol is a predictor of stroke in general population[8].

Osama et al. in 2013 found high LDL 33.3%, TG 31.4% and TC 30.5% and low HDL 25%. In India, Cynthia et al. in 2014 found high TC 40%, LDL 3%, TG 7% and low HDL 28%. The high TC pattern found in our study is similar to those found in other studies. Many studies proved that high total cholesterol levels have frequently been associated with the risk of ischemic stroke[9].

Severity In Ischemic Stroke:
LDL cholesterol has positive correlation with severity of ischemic stroke. Ranjit Patil and Uplabhdhi Raghuwanshiet reported that total cholesterol ranged from 195 – 136 mg/dL [159.36 ± 15.865]. Other parameters included mean HDL C, TG, LDL C, & VLDL-c (54.12 ± 8.93, 110.8 ± 51.87, 86.29 ± 22.7, & 22.152 ± 10.5) respectively, which were in accordance with the study conducted by Kiran Hasija & Hardeep K Bagga (2005).

In our study, there is an independent correlation between serum LDL cholesterol and severity of stroke according to NIHS Scale. It has shown that minor stroke is seen in patients with normal LDL level, moderate stroke seen in moderate raised in LDL cholesterol & moderate-severe stroke seen in patients with only high LDL cholesterol.

CONCLUSION
In the present study, it was found that males were affected more than females and was more among the elderly populations with peak age between 61-75 years. In the present study, it was found that most common clinical presentation was motor weakness with left sided hemiplegia /hemiparesis and commonest territory involved as per CT scan findings was middle cerebral artery. Out of all risk factors, hypertension was the commonest followed by smoking, dyslipidemia, alcoholism, diabetes, and obesity in order of decreasing frequency. Left ventricular hypertrophy was the most common ECG abnormality found in ischemic stroke patients. Lipid profile analysis in ischemic stroke patients showed hypercholesterolemia, hypertriglyceridemia, and high LDL values and this was more common in the age group 46-60 years. Low HDL was found to

be common in age group 61-75 years. Present study showed a definite positive correlation between lipid profile abnormality and ischemic stroke patients. The drawback of our study is that it is a government hospital-based study with limited number of patients. We need a larger prospective study with more patients including both government and private hospitals, which can give us a definitive conclusion on this enigma.

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