Section: General Medicine

Original Research Article

TO STUDY THE CORRELATION BETWEEN SERUM LOW-DENSITY LIPOPROTEIN CHOLESTEROL LEVEL WHICH PREDICTS HEMATOMA GROWTH AND CLINICAL OUTCOME AFTER ACUTE INTRA CEREBRAL HEMORRHAGE

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Abstract

Background: To study the relationship between low LDL-C and hematoma growth and clinical outcome in patients with acute intracerebral hemorrhage. **Materials and Methods:** This study was conducted in Osmania General Hospital, Hyderabad, Telangana State. A total of fifty patients of both sexes with CT evidence of spontaneous intracerebral hemorrhage admitted in emergency medical wards are studied. **Result:** Total number of patients included in the study were 50. Mean time from symptom onset to initial CT scan was 169.2_84.2 minutes, and mean time to obtain lipid profile sample was 12.1 - 7.4 hours. Among 50—32 cases had HEMATOMA GROWTH.(3 cases could not get repeat CT scan, 15 cases had no hematoma growth and had LDL >95) 32 cases had hematoma growth – 26 had END 6 cases did not have HG.i.e,80%had END and only 26% had END in whom there is no HG. 24cases had low LDL with almost all having HG and END i.e, 87.5%.and 90% respectively. Lowest LDL was 40 - highest 161 mg/dl. 11 cases died - 7 died in 48hrs, 4 in 3-7 days. Among 50 cases 24% had HTN, 6% had DM, 8% alcoholics, 12% smokers and, 28% had more than 2 risk factors, and 20% had no risk factors. Only 1 patient was on statin prior had past h/o IC Bleed LDL was 67mg/dl prognosis death. Two patients had restroke with prior hemorrhagic stroke in the past. **Conclusion:** This study in conclusion, found that there is a significant correlation in patients with acute primary supratentorial ICH between low LDL-C level (95 mg/dL) as an independent predictor of HG, END and a poor outcome.

INTRODUCTION

Cerebrovascular accident is the second commonest cause of death worldwide, with two-thirds of these deaths occurring in developing regions of the world.
Stroke is classically characterized as a neurological deficit attributed to an acute focal injury of the central nervous system (CNS) by a vascular cause, including cerebral infarction, intracerebral hemorrhage (ICH), and subarachnoid hemorrhage (SAH), and is a major cause of disability and death worldwide.[1-6]
Definition of stroke caused by intracerebral hemorrhage is rapidly developing clinical signs of neurological dysfunction attributable to a focal collection of blood within the brain parenchyma or ventricular system that is not caused by trauma according to the updated definition of stroke.[7-12]
Intra cerebral hemorrhage accounts for 10-15% of strokes. Hypertension accounts for 26-77% of cases. Hypertensive hemorrhage results from rupture of Charcot – Bouchard microaneurysms caused by small vessel disease with lipohyalinosis, fibrinoid necrosis and sub adventitial hemorrhage.[13-17]
Various studies were done to study the correlation between cholesterol levels and the risk of stroke.
Epidemiologic data (2) have clearly shown a relationship between low cholesterol levels and subsequent hemorrhagic stroke.
Recent evidence suggests that low-density lipoprotein (LDL) cholesterol concentration is inversely related to incident intra cerebral hemorrhage.
The mechanism of action is uncertain but it is suggested that low cholesterol may contribute to increased fragility of cell membranes, rendering them more susceptible to damage, although this hypothesis is by no means proven.[18-20]
A possible explanation for this relationship would be the role of serum cholesterol levels for maintaining the integrity of vascular vessels. Lower cholesterol levels have been related to the

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development of medial smooth muscle cell necrosis,16 thus decreasing the resistance to rupture of vascular wall.[21-23]

Moreover, cholesterol levels modify platelet aggregability by their action on the platelet activating factor, so that lower cholesterol levels may decrease platelet aggregation, thus predisposing to ICH growth.[24]

Lower serum low-density lipoprotein cholesterol (LDL-C) levels have been associated with increased risk of death after intra cerebral hemorrhage (ICH) Nevertheless, their link with hematoma growth (HG) is unknown.[25]

Therefore, we aimed to investigate the relationship between LDL-C levels, HG, and clinical outcome in patients with acute ICH.[26]

Aim of the Study

To study the relationship between low LDL-C and hematoma growth and clinical outcome in patients with acute intracerebral hemorrhage.

MATERIALS AND METHODS

This study was conducted in Osmania General Hospital, Hyderabad, Telangana State during a period of November 2020 to October 2021.

A total of fifty patients of both sexes with CT evidence of spontaneous intracerebral hemorrhage admitted in emergency medical wards are studied.

Inclusion Criteria

Patients of CVA with

- Primary supratentorial intra cerebral hemorrhage
- Who are >18yrs
- Presenting to the medical and neurology wards within < 6hrs of onset of symptoms in Osmania General Hospital.

Exclusion Criteria

- Patients of ischemic stroke.
- Patients <18yrs.
- Patients with traumatic ic bleed
- Spontaneous sub arachnoid hemorrhage
- Hemorrhage due to bleeding diathesis
- Primary intra ventricular hemorrhage

Prospective study of patients with primary supratentorial ICH presenting within 6 hours from symptoms onset. National Institutes of Health Stroke Scale score and ICH volume on computed tomography scan were recorded at baseline and at 24 hours.

Lipid profile was obtained.

Significant HG was defined as hematoma enlargement >33% or >6 mL at 24 hours.

Early neurological deterioration as well as mortality was recorded.

Original Article

The original article was taken from American Journal of Stroke.

"Serum Low-Density Lipoprotein Cholesterol Level Predicts Hematoma Growth and Clinical Outcome after Acute Intracerebral Hemorrhage" Stroke. 2011; 42: 2447 - 2452; originally published online July 28, 2011.

Similar articles supporting the study

Serum Cholesterol LDL and 90-Day Mortality in Patients with Intra cerebral Hemorrhage.

Stroke 2009, 40:1917-1920: originally published online March 19, 2009.

Association of Prestroke Statin Use and Lipid Levels with Outcome of Intracerebral Hemorrhage.

Low cholesterol a risk factor for primary intra cerebral hemorrhage Published in Ann Indian Acad Neurology, A case control study done in dept of neurology and medicine, Malabar institute of medical sciences, Calicut, Kerala, India.

The Complex Relationship between Cholesterol and Brain Hemorrhage Circulation. 2009; 119:2131-2133.

Circulation is published by the American Heart Association.

Neurology. 2005 Oct 25; 65 (80) Serum lipid levels and in-hospital mortality in patients with intracerebral hemorrhage.

Statistical Significance

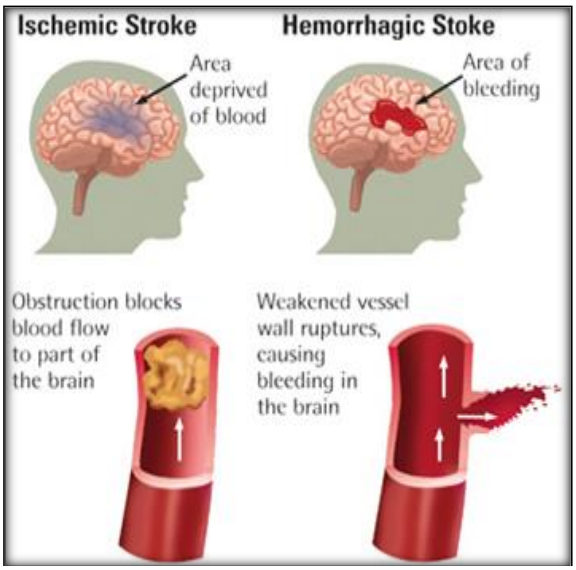
Statistical significance for intergroup differences was assessed by Pearson's _2 or Fisher's exact test for categorical variables, and by Student t test or Mann-Whitney U test for continuous variables.

Correlations between continuous variables were assessed by Spearman's correlation coefficient

Types of Stroke

There are two main types of stroke:

1. Ischemic and
2. Hemorrhagic



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RESULTS

Table 1: Age Distribution

Age	Total	Percentage
30 – 40	4	8%
40 – 50	10	20%
51 – 60	20	40%
61 – 70	10	20%
71 - 80	6	12%
Total	50	100%

Table 2: Age & Sex Distribution

Age	Male	Female	Total	Percentage
30 – 40	4	0	4	8%
40 – 50	4	6	10	20%
50 – 60	12	8	20	40%
60 – 70	7	3	20	20%
70 - 80	2	4	6	12%
Total	29	21	50	100%

Table 3: Correlation between LDL and hematoma growth

LDL Level	Hematoma Growth	No Hematoma Growth	Total
< 95 mg/dl	21	3	24
> 95 mg/dl	11	15	26
Total	32	18	50

Table 4: LDL and early neurological deficit

LDL Level	END Present	END absent	Total
< 95 mg/dl	21	3	24
> 95 mg/dl	9	17	26
Total	30	20	50

p-value is 0.0002 which is extremely statistically significant

Table 5: NIHSS Distribution

NIHSS Score	Patients	Mortality	Percentage
0-5	3	0	0%
6 – 10	6	0	0%
11-20	31	5	16.6%
> 20	10	6	60%

Table 6: GCS score distribution

GCS Score	No. of Patients	Percentage
3-5	14	28%
5-8	13	26%
9-13	16	32%
> 13	7	14%

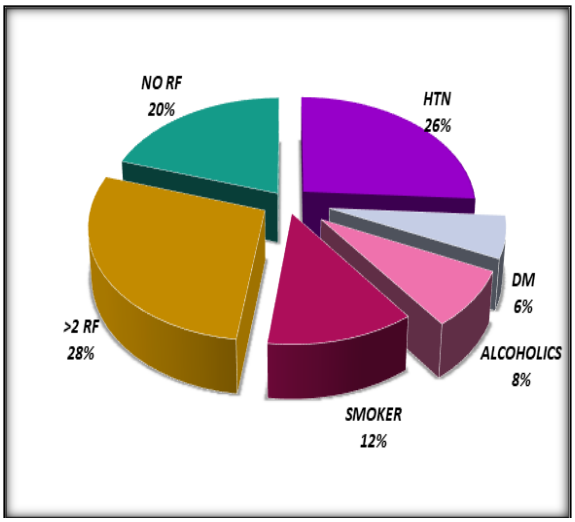
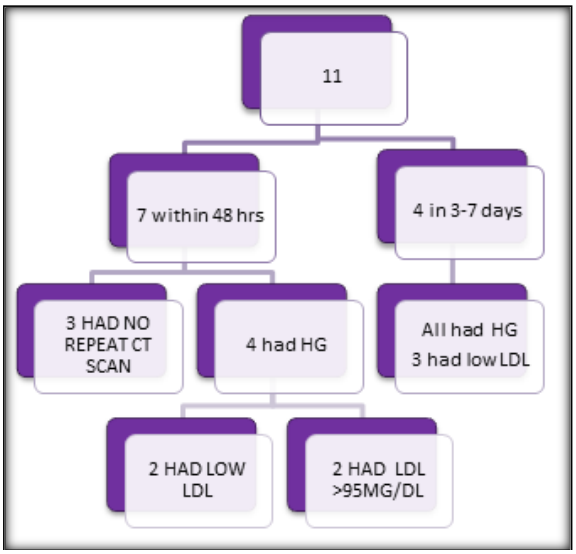


Figure 1: Risk Factors

Deaths



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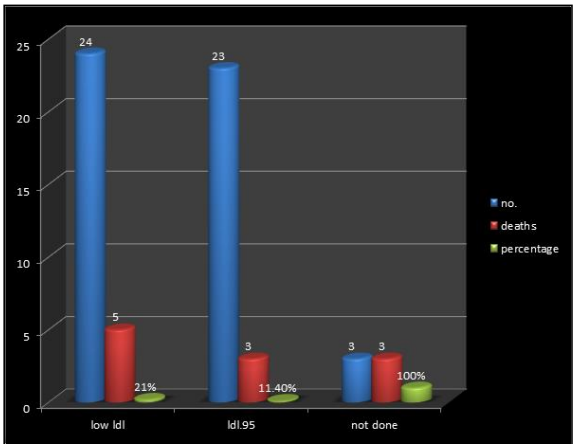

Figure 2: LDL and deaths correlation

DISCUSSION

This study shows an association between serum LDL-C levels and risk of HG after an acute primary supratentorial ICH. LDL-C levels were inversely correlated and independently associated with HG at 24 hours. Moreover, lower LDL-C levels independently predicted END.[27]

Previous studies focused on the relationship between serum cholesterol levels and risk of ICH have shown divergent results, but overall they suggest increasing ICH risk as LDL-C and total-C levels decrease.[28]

This effect, however, appears to be unrelated to statin pretreatment in patients without previous stroke. In our study, an LDL-C level<95 mg/dL emerged as a powerful predictor of HG, END and poor outcome.[29]

Moreover, LDL-C was inversely correlated with ICH volume at 24 hours, further supporting the relationship between LDL-C and HG.[30]

The mechanisms that explain the association of LDL-C and ICH are unclear. A possible explanation for this relationship would be the role of serum cholesterol levels for maintaining the integrity of vascular vessels. Lower cholesterol levels have been related to the development of medial smooth muscle cell necrosis, thus decreasing the resistance to rupture of vascular wall. Moreover, cholesterol levels modify platelet aggregability by their action on the platelet activating factor, so that lower cholesterol levels may decrease platelet aggregation, thus predisposing to ICH growth.[31]

In patients with acute primary supratentorial ICH, low LDL-C level (less than 95 mg/dL) is an independent predictor of HG, END.[32]

This study has some limitations.

Patients who were under anticoagulant treatment, those comatose, or who underwent a surgical procedure were excluded, which may underestimate the rate of END and poor outcome in our series.

However, patients with these conditions usually receive different treatments than do those without, making difficult any comparison between them.

CONCLUSION

A number of clinical studies were done to demonstrate the role of low LDL and intra cerebral hemorrhage.

This study in conclusion, found that there is a significant correlation in patients with acute primary supratentorial ICH between low LDL-C level (95 mg/dL) as an independent predictor of HG, END and a poor out come.

LDL levels less than 95 mg/dl was inversely related to the outcome in spontaneous intra cerebral hemorrhage and caused significant hematoma growth in first 24 hr of presentation.

Low LDL levels were significantly correlated with the hematoma growth after 24 hrs of ICH.

However it is very premature to draw a conclusion without a long term follow up, so a large duration prospective study may be needed to draw a definite conclusion regarding the role of low LDL in correlation with the poor outcome in intra cerebral hemorrhage.

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