A Cross Sectional Study To Find The Association Of Lipoprotein (a) And Lipid Profile In The Patients With Thrombotic Stroke

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ABSTRACT

Background:
Stroke is a leading cause of mortality and disability worldwide, with ischemic stroke being the most prevalent type. Dyslipidemia, particularly elevated lipoprotein(a) [Lp(a)] levels, has been identified as a potential risk factor for ischemic stroke, although findings across studies are inconsistent. This study aims to explore the association between Lp(a) levels and lipid profiles in patients with thrombotic stroke.

Objective:
To investigate the relationship between Lp(a) levels and lipid profiles in patients diagnosed with thrombotic stroke.

Methods:
This cross-sectional study was conducted at SSIMS and RC Hospital, involving 60 patients confirmed to have thrombotic stroke via CT/MRI. Participants' lipid profiles, including total cholesterol, triglycerides, HDL, and LDL levels, were measured along with Lp(a) levels. Statistical analyses were performed using SPSS, with the chi-square test used to determine associations between Lp(a) and lipid parameters.

Results:
The study found that 35% of participants had elevated Lp(a) levels. Significant proportions of patients also exhibited dyslipidemia, with 58.3% having LDL levels between 116-190 mg/dL and 45% having a cholesterol/HDL ratio greater than 5. No statistically significant associations were observed between Lp(a) levels and total cholesterol or triglyceride levels. However, a significant association was found between Lp(a) levels and the cholesterol/HDL ratio ($p = 0.003$).

Conclusion:
The findings suggest that Lp(a) alone is not a significant risk factor for stroke, however it had association with cholesterol/ HDL ratio.

Keywords: Lipoprotein(a), Ischemic Stroke, Dyslipidemia, Lipid Profile, Cholesterol/HDL Ratio

INTRODUCTION:

Stroke is a leading cause of mortality and disability worldwide, with ischemic stroke being the most prevalent type[1]. The traditional risk factors for ischemic stroke are hypertension, diabetes, smoking and dyslipidemia[2]. Dyslipidemia particularly elevated low-density lipoprotein cholesterol (LDL-C) and decreased high-density lipoprotein cholesterol (HDL-C) play a crucial role in the development of atherosclerotic coronary heart disease, which is a precursor to ischemic stroke .

Lipoprotein (a) [Lp(a)] is a lipoprotein subclass that consists of an LDL-like particle and a specific protein called apolipoprotein(a). Elevated levels of Lp(a) have been implicated in the pathogenesis of cardiovascular diseases, including coronary artery disease and ischemic stroke. Elevated Lp(a) is thought to contribute to atherosclerosis by promoting the accumulation of cholesterol in arterial walls and enhancing inflammation and thrombosis[3] .

Despite the known association between Lp(a) and cardiovascular diseases, the specific relationship between Lp(a) levels and thrombotic stroke remains underexplored. Existing studies have produced conflicting results, and there is a lack of comprehensive data on this association, particularly in the Indian population[4].

Previous studies on the association between Lp(a) levels and stroke have yielded inconsistent findings. Some studies have reported a significant correlation between elevated Lp(a) levels and an increased risk of ischemic stroke, while others have found no such association. These discrepancies highlight the need for further research to clarify the role of Lp(a) in stroke pathogenesis[5] .

OBJECTIVE

To find the association of lipoprotein (a) levels with the lipid profile in patients with thrombotic stroke.

METHODOLOGY

This Cross-sectional study was conducted on patients with CT/MRI scan evidence of thrombotic stroke who fulfilled the inclusion criteria and were admitted to the medicine ICU and wards of SSIMS and RC Hospital. The selected patients will be evaluated as per proforma.

Patients will undergo the following investigations complete blood count , blood sugar, serum urea, serum creatinine, liver function tests, fasting lipid profile and lipoprotein (a) levels

Sample size was estimated based on the formula 4pq/d2 where p is the prevalence of ischemic stroke in hospital for one year, p=0.132% and q =1-p and d=1. It will come to 51 and it was rounded off to 60.

INCLUSION CRITERIA:

1. Patients confirmed to have thrombotic stroke on CT/MRI scan with or without hypertension and diabetes mellitus.

EXCLUSION CRITERIA:

1. Patients with haemorrhagic stroke.
2. Patients with stroke secondary to congenital heart disease or arrhythmias.
3. Patients with pre-existing renal or hepatic disease.
4. Patients on any drugs known to alter lipoprotein (a) levels.
5. Patients who did not give consent for the study

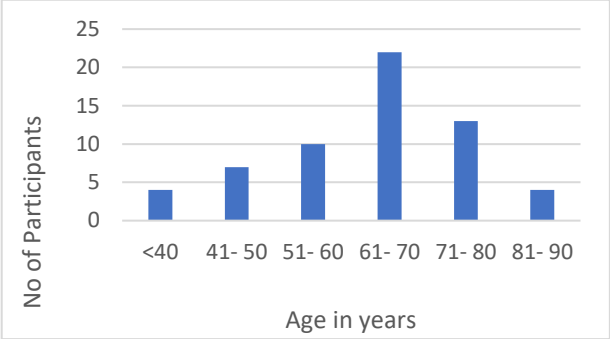
DATA ANALYSIS

Statistical analysis was performed using statistical software package SPSS version 20.

Qualitative data were expressed as numbers and percentages. The Chi-Square test was utilized to determine any significant associations. Statistical significance was set at a p-value of <0.05, ensuring that the observed differences or relationships were unlikely due to chance.

RESULTS

Graph1 : Age distribution among study participants

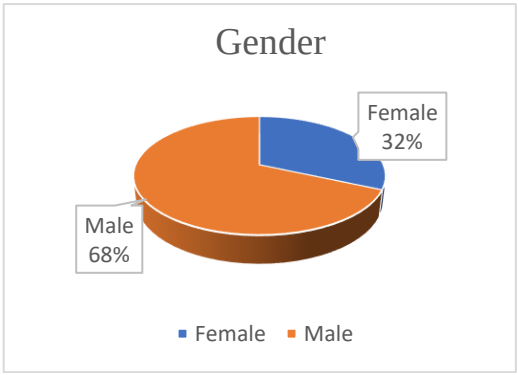


The age distribution of the study population reveals that the majority of participants were between 61 and 70 years old, accounting for 36.7% of the total sample.

Table1 : Gender distribution among study participants

GENDER	NUMBER OF PARTICIPANTS	PERCENTAGE
FEMALE	19	31.7%
MALE	41	68.3%
TOTAL	60	100

The gender distribution reveals that 31.7% (19 participants) were female and 68.3% (41 participants) were male. This indicates a higher proportion of male participants in the study.



Graph 2: Gender distribution among study participants

Tabl 2: Lp(a) distribution among study participants

Lp(a) (mg/dl)	NUMBER OF PARTICIPANTS	PERCENTAGE
<30	39	65%
>30	21	35%
TOTAL	60	100%

The study found that 65.0% of participants had Lipoprotein(a) levels below 30 mg/dL, while 35.0% had levels above 30 mg/dL.

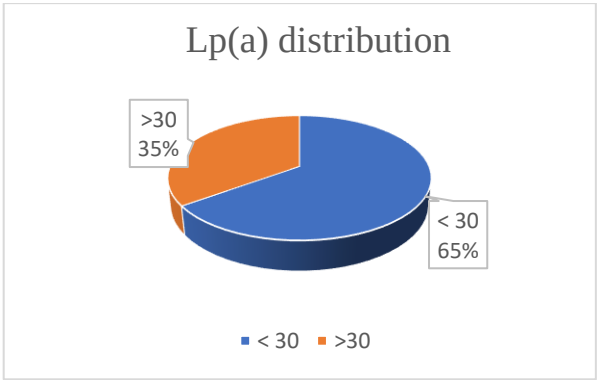
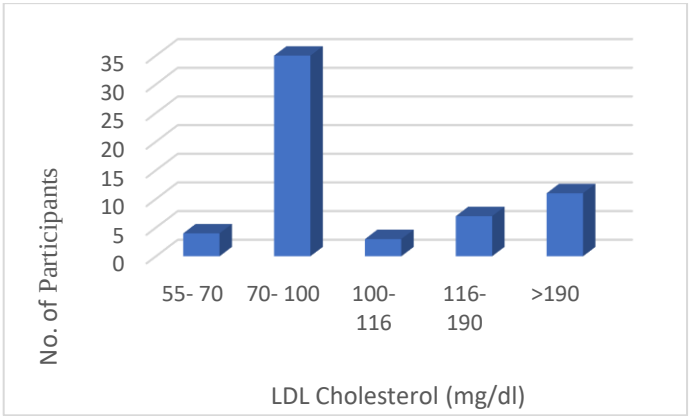


Table 3: Distribution of LDL Cholesterol among study participants

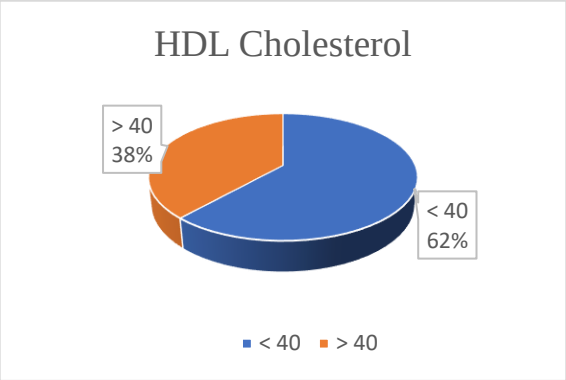
LDL CHOLESTEROL (mg/dl)	NUMBER OF PARTICIPANTS	PERCENTAGE(%)
55-70	3	5%
70-100	7	11.7%
100-116	4	6.7%
116-190	35	58.3%
>190	11	18.3%
TOTAL	60	100%

The study found that 58.3% of participants had LDL levels between 116-190 mg/dL, with 18.3% having levels above 190 mg/dL. Smaller proportions of participants had LDL levels between 70-100 mg/dL (11.7%), 100-116 mg/dL (6.7%), and 55-70 mg/dL (5%).



Distribution of LDL Cholesterol among study participant

Table 4. Distribution of HDL cholesterol among study participants



The study revealed that 61.7% of participants had HDL levels below 40 mg/dL, while 38.3% had levels above 40 mg/dl.

Table 5: Distribution of CHOLESTEROL/ HDL ratio among study participants

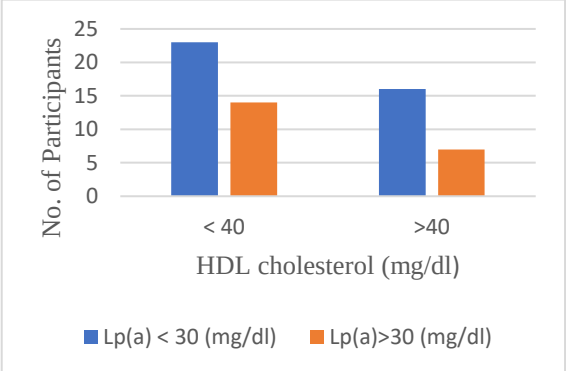
CHOLESTEROL/HDL RATIO	NUMBER OF PARTICIPANTS	PERCENTAGE
<5	33	55%
>5	27	45%
TOTAL	60	100%

The study found that 55.0% of participants had a CHOLESTEROL/HDL ratio below 5, while 45.0% had a ratio above 5.

Table 6. Association between HDL CHOLESTEROL and Lp(a)

HDL CHOLESTEROL (mg/dl)	Lp(a) < 30 (mg/dl)	Lp(a)>30 (mg/dl)	TOTAL	χ^2 Value	p value
< 40	23	14	37	0.342	0.559
>40	16	7	23		
Total	39	21	60		

Among participants Overall, 61.7% of the total study population had HDL levels below 40 mg/dL. The chi-square test did not reveal a statistically significant association between HDL levels and Lp(a)categories ($\chi^2 = 0.342$, df = 1, P = 0.559).

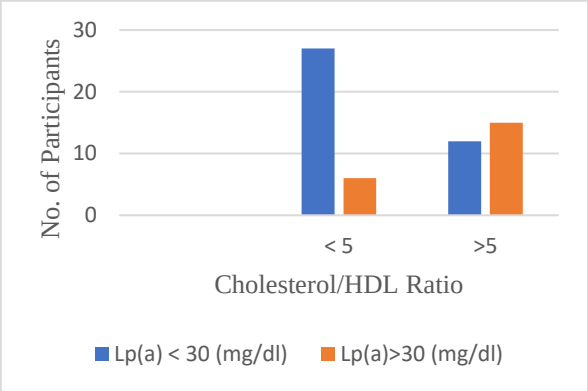


Graph 6: Association between HDL CHOLESTEROL and Lp(a)

Table7: Association between CHOLESTEROL/HDL ratio and Lp(a)

CHOLESTEROL/HDL RATIO	Lp(a) < 30 (mg/dl)	Lp(a)>30 (mg/dl)	TOTAL	χ^2 Value	p value
< 5	27	6	33	9.12	0.003
>5	12	15	27		
Total	39	21	60		

The overall distribution showed that 55.0% of the total population had a Cholesterol/HDL ratio below 5. The chi-square test revealed a statistically significant association between Cholesterol/HDL ratio and Lp(a) levels ($\chi^2 = 9.12$, df = 1, P = 0.003).



Graph 7: Association between CHOLESTEROL/HDL ratio and Lp(a)

DISCUSSION

In our study, the majority of participants (36.7%) were aged between 61-70 years, followed by 21.7% in the 71-80 years age group. This distribution aligns with the well-established understanding that the risk of thrombotic stroke increases with age.

In our study, 35% of participants had Lipoprotein(a) [Lp(a)] levels above 30 mg/dL, a threshold commonly associated with increased cardiovascular risk.

Lastly, the **CHOLESTEROL/HDL ratio**, an important marker of cardiovascular risk, was above 5 in 45% of participants, categorizing them as high risk.

The analysis of **HDL cholesterol levels** in our study revealed that 66.7% of participants with elevated Lp(a) levels had HDL levels below 40 mg/dL, which is considered low and indicative of increased cardiovascular risk.

A particularly noteworthy finding in our study is the significant association between the **CHOLESTEROL/HDL ratio and Lp(a)** levels. Participants with Lp(a) levels above 30 mg/dL were more likely to have a CHOLESTER/HDL ratio greater than 5 (71.4%), with a statistically significant chi-square value (p = 0.003).

CONCLUSION

In conclusion, this study highlights the significant prevalence of dyslipidemia, particularly elevated Lipoprotein(a), total cholesterol, triglycerides, and LDL cholesterol, along with low HDL cholesterol levels, among thrombotic stroke patients. There was no significant association between Lp(a)and lipid profile, except for the association of Lp(a) with Cholesterol-HDL ratio.

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