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Original Research Article

Role of Lipid Profile in Acute Ischemic Stroke

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Abstract:

Background: A stroke is characterized by rapidly evolving symptoms and/or signs of a localized and widespread loss of brain function that lasts for at least twenty-four hours and has no discernible cause other than vascular origin. It ranks as the second most common cause of mortality globally. About 15% of strokes are caused by intracerebral or subarachnoid hemorrhage, whereas 85% are ischemic. Risk factors that can be controlled include high blood pressure, diabetes, high cholesterol, atrial fibrillation, smoking, substance misuse, and alcohol consumption. Atherosclerosis development has been linked to changes in the lipid profile. As a result, risk factor intervention must be done effectively. Total cholesterol (TC), low-density lipoprotein (LDL), high-density lipoprotein (HDL), and triglycerides (TG) are among the several factors that determine the fasting lipid profile.

Methods: 100 acute ischemic stroke patients who arrived at K.R. Hospital in Mysore were the subjects of a cross-sectional study conducted over the course of one and a half years (February 2022–August 2023). Determining whether hypecholesterolemia is a risk factor for high severity was the primary objective. Included were patients over the age of eighteen who had an acute ischemic stroke verified by radiography. Patients with underlying conditions such as a past history of stroke, TIA, cardiac and liver disease, hypothyroidism or any medication that lowers cholesterol were not included. Blood was drawn from the patients after they had fasted for nine to twelve hours in order to measure their lipid profiles. NIHSS evaluated the stroke's severity. NIHSS scores were used to categorize people into four groups: minor (1-4), moderate (5-15), moderate to severe (16-20), and severe (21-42). Additionally, lipid profiles were compared for stroke severity. Data will be presented as descriptive statistics in the form of frequency tables and graphs after being analyzed using SPSS software version 22.0. Statistical significance is defined as a p value of less than 0.05.

Results: Higher TC, TGL, and LDL levels were linked to more severe strokes in 100 cases. There were nine in the minor group, forty-seven in the moderate group, twenty-nine in the moderate to severe group, and fifteen in the severe group.

Conclusion: The risk of a severe stroke is increased by higher TC, TGL, LDL, and decreased HDL. Association were evident for elevated TC and LDL levels. Minimizing the risk and preventing morbidity and death can be achieved through early detection and treatment with lipid-lowering medications.

Keywords: Stroke, Lipid profile, HDL, NIHSS.

Introduction

A stroke is characterized by rapidly evolving symptoms and/or signs of a localized and widespread loss of brain function that lasts for at least twenty-four hours and has no discernible cause other than vascular origin.[1]. It ranks as the second most common cause of mortality globally. About 15% of strokes are caused by intracerebral or subarachnoid hemorrhage, whereas 85% are ischemic.[2]. Risk factors that can be controlled include high blood pressure, diabetes, high cholesterol, atrial fibrillation, smoking, substance misuse, and alcohol consumption.[3]. Atherosclerosis development has been linked to changes in the lipid profile [4]. As a result, risk factor intervention must be done effectively. Total cholesterol (TC), low-density lipoprotein (LDL), high-density lipoprotein (HDL), and triglycerides (TG) are among the several factors that determine the fasting lipid profile.Finding particular indicators of stroke outcome can greatly aid in developing a more effective treatment plan. According to available data, the severity of a stroke is a reliable indicator of both mortality and functional outcome. However, throughout the previous few decades,

there has been no decline in stroke mortality. Consequently, proper classification with respect to stroke outcomes requires an efficacious detectable marker. The time pattern of lipid changes in stroke patients and their prognostic significance are still unclear, although acute lipid changes have been thoroughly studied and are well known for acute myocardial patients. Thus, our study's objective was to evaluate the temporal changes in lipids in stroke patients upon admission and their association with the severity of acute stroke

Objectives of the Study

- To evaluate lipid profile levels in a patient with acute ischemic stroke.
- To compare this parameter with severity of stroke.

Materials -and Methods

The cross-sectional study of one and half year duration (October 2022 to September 2023) was done on 100 patients of acute ischemic stroke presented to K.R. Hospital, Mysore.

The main goal was to determine whether hypocholesterolemia is a risk factor for high severity. Patients above 18yrs and acute ischemic stroke confirmed with radio imaging were included. Patients with underlying condictiones like previous stroke, Tia's, Liver and cardiac illness, hypothyroidism, active illness and any lipid lowering agents were excluded.

Lipid profile was measured by collecting the patients' blood after fasting for 9 to 12 hours. Severity of stroke was assessed by NIHSS. Based on NIHSS scores divided into minor (1-4), moderate (5-15), moderate to severe (16-20), severe (21-42) groups. Along with assessment with severity, lipid profile were compared between severities of stroke.

Source of data

Primary sources

- Acute ischemic stroke Subjects admitted in K R hospital, Mysuru.

Secondary source

- Information including published articles, journals, books and related websites

Methods of Collection of Data

Study design: Cross sectional study

Study duration: October 2022 to September 2023

Place of study: K R Hospital, MMCRI, Mysuru

Sample size: 100

100 cases with acute ischemic stroke will be studied

$S = Z^2 pq/d^2$

S = 1.96 X 1.96 X 0.05 X 0.95/0.05 X 0.05

S = 73

Z = 1.96 Confidence interval=0.05

p = Proportion of prevalence =5 %=0.05

q = 1-p = 0.95

d = Margin of Error (5%) = 0.05

Inclusion Criteria & Exclusion Criteria

Acute ischemic stroke subjects with age >18 years admitted in K R Hospital, Mysuru were Included in this study and Subjects on lipid lowering drugs were excluded.

Statistical analysis: Data analysed using SPSS software version 22.0 and it will be presented as descriptive statistics in form of frequency table and graphs. Association between variables will be done using chi-square test and unpaired t test for qualitative and quantitative variables. Result will be expressed as mean+/-SD. Correlation of parameters is done by Pearson's correlation formula. A p value of <0.05 is considered statistically significant.

Results

- Among 100 cases higher levels of TC, TGL, LDL were associated with more severity of stroke. 9 were in minor group, 47 were in moderate group, 29 were in moderate to severe group, 15 were in severe group. Mean level in severity groups.
- Minor – TC154.65±26mg/dl, TGL-97.6±18 mg/dl, LDL-83mg/dl, VLDL-33.8±7mg/dl, HDL-37.8±3mg/dl.
- Moderate - TC-174.42±36mg/dl, TGL-132.21±40mg/dl, LDL-99.43±19mg/dl, VLDL-40.26±10mg/dl, HDL-34.7±3mg/dl.
- Moderate to severe- TC-218.62±m59g/dl, TGL-180.13±m68g/dl, LDL-134.9±29mg/dl, VLDL-50.49±14mg/dl, HDL-33.12±3mg/dl
- Severe - TC-284.68±108g/dl, TGL-246.03±93 g/dl, LDL-186.66±m48g/dl, VLDL-68.45±26 mg/dl, HDL-31.07±4mg/dl.
- P value being <0.05.

Table 1: Showing mean values

		Descriptives			
		N	**Mean**	**Std. Deviation**	**Std. Error**
	Minor	9	117.7778	15.11438	5.03813
	Moderate	47	144.6809	47.62585	6.94694
RBS	Moderate to Severe	29	199.1724	83.00950	15.41448
	Severe	15	250.4667	144.43677	37.29341
	Total	100	173.9300	87.96823	8.79682
	Minor	9	154.6556	26.20473	8.73491
	Moderate	47	174.4213	36.14136	5.27176
TC	Moderate to Severe	29	218.6138	59.50801	11.05036
	Severe	15	284.6867	108.07097	27.90381
	Total	100	201.9980	70.69102	7.06910
	Minor	9	97.6000	18.27929	6.09310
	Moderate	47	132.2149	40.82042	5.95427
TGL	Moderate to Severe	29	180.1379	68.88787	12.79216
	Severe	15	246.0333	93.37239	24.10865
	Total	100	160.0700	73.05528	7.30553
	Minor	9	37.8556	3.02618	1.00873
	Moderate	47	34.7000	3.77123	.55009
HDL	Moderate to Severe	29	33.1276	3.71963	.69072
	Severe	15	31.0733	4.67875	1.20805
	Total	100	33.9840	4.17870	.41787
	Minor	9	83.0000	19.10792	6.36931
	Moderate	47	99.4340	29.87402	4.35757
LDL	Moderate to Severe	29	134.9931	48.35324	8.97897
	Severe	15	186.6600	82.17786	21.21823
	Total	100	121.3510	55.88350	5.58835
	Minor	9	33.8000	7.34166	2.44722
	Moderate	47	40.2638	10.64861	1.55326
VLDL	Moderate to Severe	29	50.4931	14.49980	2.69255
	Severe	15	68.4533	26.76613	6.91098
	Total	100	46.8770	18.12441	1.81244
	Minor	9	4.0378	.60599	.20200
	Moderate	47	5.0234	1.18436	.17276
TC_HDL	Moderate to Severe	29	6.7162	2.36612	43938
	Severe	15	9.4200	4.15059	1.07168
	Total	100	6.0851	2.72378	27238

Table 2: Showing p value (ANOVA)

TC (mg/dl)	**154.66(±26.2)**	**174.42(±36.14)**	**218.61(±59.51)**	**284.69(±108.07)**	**.000**
TGL (mg/dl)	97.6(±18.28)	132.21(±40.82)	180.14(±68.89)	246.03(±93.37)	.000
HDL (mg/dl)	37.86(±3.03)	34.7(±3.77)	33.13(±3.72)	31.07(±4.68)	.000
LDL (mg/dl)	83(±19.11)	99.43(±29.87)	134.99(±48.35)	186.66(±82.18)	.000
VLDL (mg/dl)	33.8(±7.34)	40.26(±10.65)	50.49(±14.5)	68.45(±26.77)	.000
TC/HDL	4.04(±0.61)	5.02(±1.18)	6.72(±2.37)	9.42(±4.15)	.000

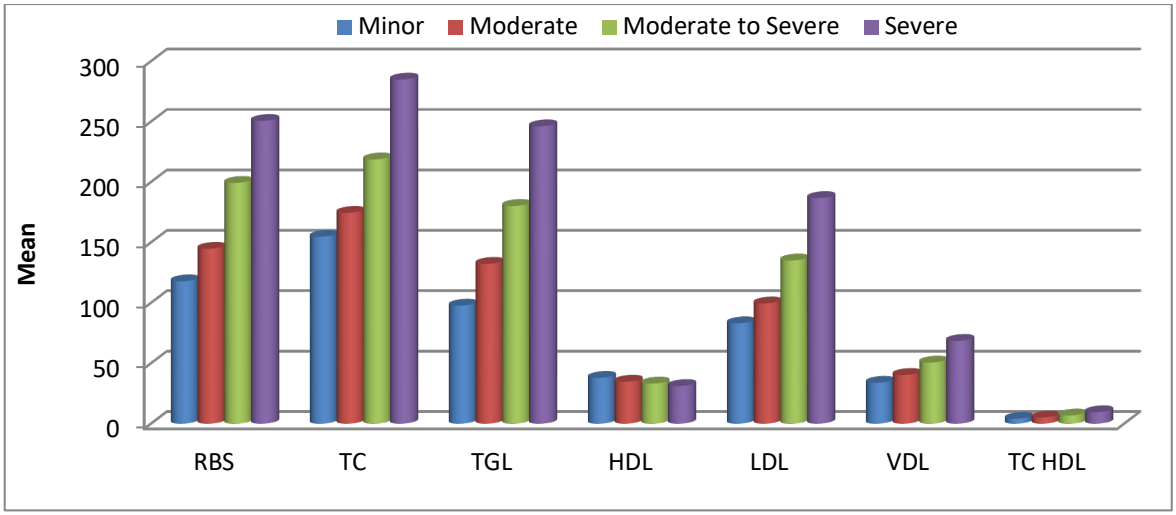

Figure 1:

Discussion

Total cholesterol, triglycerides, and LDL levels were higher than normal in this study, but HDL levels were lower in each group. The mean levels of TC, TGL, LDL, and VLDL rise in proportion to the severity, whereas the mean HDL level falls.

HDL reduces neuronal damage through an antioxidant and anti-inflammatory mechanism, but TC and LDL aid in the development of atheroma.

A statistically significant P value of less than 0.05 indicates a clinical association with stroke severity.

Comparing the results with a study by Muhammad Shoaib Asghar in Karachi in 2020, it was found that ischemic stroke was positively correlated with high LDL and TC, whereas hemorrhagic stroke was not.[5]

According to a 2009 study by Joshua Z. Willey in northern Manhattan, low LDL-C levels were significantly linked to a decreased risk of stroke in atherosclerotic types and in people over 75 and in the atherosclerotic stroke subtype, high HDL-C was found to have a strong protective impact against ischemic stroke.[6]

Conclusion

The risk of a severe stroke is increased by higher TC, TGL, LDL, and decreased HDL. Association were robust for elevated TC and LDL levels. Reducing risk and preventing morbidity and death can be achieved through early detection and treatment with lipid-lowering medications.

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