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Dyslipidaemia In Acute Non-Cardioembolic Ischemic Stroke Patients At A Tertiary Care Center

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ABSTRACT

Objective: To determine the frequency of dyslipidaemia in acute non-cardio embolic ischemic stroke patients at a tertiary care centre in Rawalpindi.

Study Design: Cross-sectional study

Place and Duration of Study: Neurology Department, Pak Emirates Military Hospital (PEMH), Rawalpindi Pakistan, Jul 2022 to Feb 2023.

Methodology: Patients with acute non-cardio embolic ischemic stroke were included. Data was collected from the patient files and hospital records including a thorough history, physical examination information, CT/MRI brain, fasting lipid profiles with total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), and triglycerides (TG).

Results: The study included 196 patients, of which dyslipidaemia was seen with a major share of high TG in 44(22.44%), followed by high LDL cholesterol in 38(19.38%), and high TC was found in 28(14.28%).

Conclusion: More than 1/3rd of patients with acute non-cardioembolic ischemic stroke have dyslipidaemia.

Keywords: Cardio-embolic ischemic stroke, Dyslipidaemia, Lipid, Lipoprotein.

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INTRODUCTION

A stroke is the abrupt development of a neurological deficit caused by a localised vascular source, with symptoms lasting 24 hours or more.[1] According to the World Health Organization (WHO), stroke is one of the top five diseases in the world in terms of disability. It is the second most common cause of death globally, after heart ischemia. Adjusted-life-years.[2] It is categorised as haemorrhagic or ischemic. Ischemia can occur in all or part of the region of the occluded artery due to atherosclerotic blockage of the lumen of big cervical and cerebral arteries by an embolism or thrombus.[3] The non-pharmacological interventions in dyslipidaemia include lifestyle modifications such as weight reduction, daily one-hour moderate-vigorous exercise, smoking cessation, stress management, and getting 6–8 hours of sleep at night while in secondary prevention cholesterol-lowering medication is used in conjunction with diet modifications.[4]

It is the primary global cause of death and permanent disability.[5] Elevated total cholesterol (TC), elevated LDL-C, elevated triglycerides (TG), and decreased HDL-C are all signs of dyslipidaemia, which is the presence of abnormally high levels of lipids or lipoproteins in the blood (HDL-C).[6] One of the most significant risk factors for atherosclerosis which causes ischemic strokes.[7] A study conducted in 2016 by Schietz *et al*. discovered that beginning statin therapy quickly after an acute ischemic stroke may reduce 90-day mortality.[8] According to a study done in March 2022 at Biratnagar Teaching Hospital in Nepal, 46.05% of patients with acute non-cardioembolic ischemic stroke had dyslipidaemia overall. Patients were found to have high TC (31.43%), high TG (71.43%), high LDL cholesterol (28.57%), and low HDL cholesterol (31.43%).[2] There is the lack of information on the trends of dyslipidaemias about non-cardioembolic ischemic stroke in our local population. The objective of study was to determine the frequency of dyslipidaemia among patients who had acute non-cardioembolic ischemic strokes at a tertiary care facility in Rawalpindi.

METHODOLOGY

The cross-sectional study was conducted on patients with acute non-cardio embolic ischemic stroke whom their attendants brought to the Neurology Department, Pak Emirates Military Hospital, Rawalpindi, Pakistan from July 2022 to February 2023, after obtaining approval from the Ethical Review Board Committee (IRB-Reference number:

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A/28/239(2)/EC/505/123).The sample size was calculated using population proportion of stroke of 7.6%.[9]

Inclusion Criteria: Patients of either gender and age group, with acute non-cardioembolic ischemic stroke who were clinically diagnosed and/or radiologically demonstrated were included.

Exclusion Criteria: Patients with ischemic heart disease, history of myocardial infarction, atrial fibrillation, subarachnoid haemorrhage, those with a subacute or prior history of ischemic stroke, defined as lasting longer than a week, hypoglycemia, hyponatremia, hemiplegic migraine, seizure episode, head injury, brain tumour, pregnancy, and presumptive diagnosis of stroke without radiological evidence, as well as those taking lipid-lowering medications or having hereditary hyperlipidemia were excluded.

The non-probability consecutive sampling technique was performed. Patients whose blood samples for lipid profiles were taken within 72 hours after their hospital admission with raised TG level 150mg/dL, high LDL 130mg/dL, lowered HDL-Cholesterol 40mg/dL in men and 50mg/dL in women, and TC level 200mg/dL were all considered for lipid abnormalities.

Male patients were assigned in the Group-1, and female patients were assigned in the Group-2. Data were collected from the patient files and hospital records, including a thorough history and physical examination information. Radiographic and laboratory reports were gathered, such as CT/MRI brain and fasting lipid profiles with total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), and triglycerides (TG) values represented in mg/dL. The population prevalence fraction of patients with aberrant lipid profiles who had an ischemic stroke within 72 hours of the onset of stroke symptoms was used.[11]

Statistical Package for Social Sciences (SPSS) version 24.0 was used for the data analysis. Quantitative variables were expressed as Mean±SD and qualitative variables were expressed as frequency and percentages. Independent sample t-test was applied to explore the inferential statistics. The p-value lower than or up to 0.05 was considered as significant.

RESULTS

One hundred ninety-six participants were included, out of which 78(39.79%) were males 118(60.21%) were females. Patients with acute non-cardioembolic ischemic stroke who presented with dyslipidaemia had a mean age of 59.58+11.45 years. The dyslipidaemia among the acute non-cardioembolic ischemic stroke patients in our hospital was present in 74(37.75%) patients. 28(14.28%) patients had high TC, 44(22.44%) had high TG, 38(19.38%) had high LDL, and 22(11.22%) had low HDL cholesterol. The dyslipidaemia was split evenly between the genders in stroke patients, with 36(18.36%) in Group-1 and 38(19.38%) in Group-2. Results were statistically significant, as shown in Table.

Table: Distribution of Dyslipidemia in the Study Population (n=196)

Baseline Characteristics	Study Groups		*p*-value
	Male Patients (n=78) (Mean±SD)	Female Patients (n=118) (Mean±SD)	
Total Cholesterol Levels (mg/dl)	1.21±0.41	1.25±0.44	0.043
Triglycerides Levels (mg/dl)	1.28±0.46	1.22±0.42	0.039
Low-Density Lipoprotein Levels(mg/dl)	1.28 ±0.46	1.15 ±0.36	0.011
High-Density Lipoprotein Levels(mg/dl)	1.13±0.34	1.14±0.35	0.049

Likewise, high TC was present in 14(7.14%) females and 14(7.14%) males, whereas high TG was seen in 24 (12.24%) females and 20(10.20%) males. Similarly, 18(9.18%) females and 20(10.20%) males had high LDL, whereas 12(6.12%) females and 10(5.10%) males had low HDL, as shown in Figure.

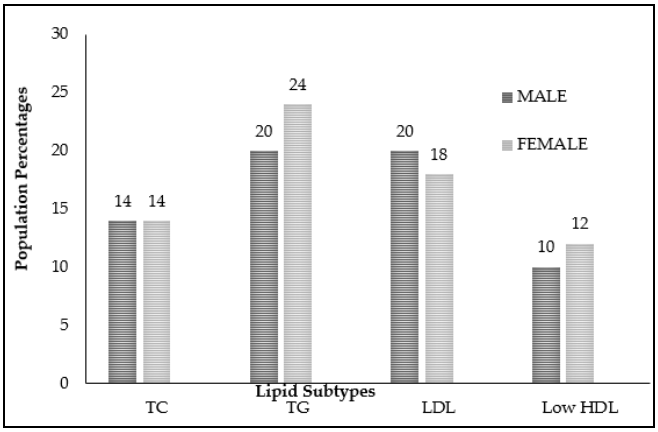

Figure: Dyslipidemia Pattern in Male and Female Patients in Percentages (n=196)

DISCUSSION

Stroke is a major cause of morbidity, which leaves 15–30% of survivors permanently handicapped and 20% of survivors needing institutional care after three months 10% to 15% of strokes in Pakistan, where ischemic strokes account for 80% of all strokes, happen in people under the age of 40 and are primarily caused by cerebral atherosclerosis.In roughly 8% of ischemic strokes, atherosclerosis involving the major cerebral arteries is the primary factor.10,11 Lipid-lowering medications may reduce the growth of atherosclerotic plaque and possibly reverse the plaque-formation process.[12] Within the first two years, ischemic stroke recurrence accounts for 15–30% of cases.[13] Hypertriglyceridemia was shown to be the most common dyslipidaemia in ischemic stroke, with a frequency of 40.1%, according to a local study conducted in August 2016 at tertiary care in Hyderabad/Jamshoro.14 According to our study, hypertriglyceridemia is the main contributing factor to the 37.75% dyslipidaemia among acute non-cardioembolic stroke patients in our hospital. This high dyslipidaemia is comparable to a study conducted among Pakistani patients at Holy Family Hospital, Rawalpindi, from January 2013 to December 2013, where the dyslipidaemia was found to be 43.7% and could be caused by people's sedentary lifestyles and environmental changes.[15] Olamoyegun *et al*.study in Nigeria found a considerably higher incidence of dyslipidaemias (92.30%) among ischemic stroke patients. The fact that our analysis only included patients with non-cardioembolic ischemic stroke may be the reason.[16] Elevated baseline TG/HDL, TC/HDL, and TC/HDL ratios were shown in a randomised multicenter controlled trial involving 3680 ischemic stroke patients to be significant predictors of future vascular risk following an ischemic stroke. In contrast, an elevated TG/HDL ratio was associated with the risk of recurrent stroke.[17] The Honolulu Heart Program study, which followed Japanese men (aged 45 to 68) from 1965 to 1968, found a significant three-fold higher risk of having a thromboembolic ischemic stroke with decreasing HDL levels. This finding was corroborated by a case-control study conducted in Manhattan from 1993 to 1997, which found that higher HDL levels were linked to a lower risk of ischemic stroke in the elderly.[18]

Contrary to what was shown in earlier investigations, the analysis of 25 cohort studies from 1966 to 1994 did not discover any significant associations between ischemic stroke and either HDL cholesterol or the TC/HDL cholesterol ratio.19 Independent investigations by Ramesh Kumar *et al*. in Pakistan 14(40%) and Maskey *et al*.[11] in Nepal (23%) also revealed comparable results with a high proportion of hypertriglyceridemia among stroke patients. Despite the small sample size and descriptive nature of our findings, they can still provide insight into the overall burden of dyslipidemia among acute non-cardioembolic ischemic stroke patients, guiding early interventions towards timely diagnosis, monitoring, and treatment of dyslipidemia to reduce the risk of stroke incidences.

CONCLUSION

Dyslipidaemia is one of the modifiable risk factors for the development of stroke. In our study, the dyslipidaemias among patients with acute non-cardioembolic ischemic stroke at a tertiary care facility in Rawalpindi was found to be higher.

Conflict of Interest: None.

Authors Contribution

Following authors have made substantial contributions to the manuscript as under:

MU & AZK: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

ABM & MFH: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

II & JI: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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