



Original Research

Frequency of Deranged Lipid Profile in Patients with Stroke

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ABSTRACT

Objective: This study aims to find out the frequency of patients with strokes at Lady Reading Hospital in Peshawar have abnormal lipid profiles.

Materials & Methods: The Department of Medicine at Lady Reading Hospital in Peshawar conducted this cross-sectional, descriptive study. There were 96 patients in all, both genders, who presented with a stroke between the ages of 30 and 70. Individuals with CRF (chronic renal failure), CLD (chronic liver disease), or medications that reduce cholesterol were not included. Blood samples were collected and transferred to the laboratory to measure the lipid profile.

Results: In this study, the age range was 30 to 70 years old, with a mean age of 53 years. The majority of the patients (54.17%) ranged in age from 51 to 70. There were 58.33% males and 41.67% females. 40 (41.67%) stroke patients had a disordered lipid profile. Of the stroke patients, 41.67% had abnormal total cholesterol, 53.13% abnormal LDL cholesterol, 25.0% abnormal triglyceride levels, and 21.88% abnormal HDL cholesterol.

Conclusion: This study concluded that the frequency of dyslipidemia in stroke patients is very high. With this knowledge, specialized statin drugs could be created, leading to better disease control. Patients with ischemic stroke were more likely than those with hemorrhagic stroke to have abnormalities in their lipid levels.

Keywords: Stroke, Cholesterol level, Dyslipidaemia, Lipid Profile, Cerebrovascular Accidents.

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INTRODUCTION

Strokes, characterized by sudden and significant loss of brain function without a known cause other than vascular issues, account for 12.5% of all deaths.¹ Stroke is a significant contributor to mortality. Stroke causes a substantial amount of impairment for individuals and their families in addition to its lethal consequences.² Targeting risk factors with an effective intervention is the most practical way to reduce stroke-related morbidity

and death.³ Unlike its proven involvement in myocardial infarction, the importance of lipid profile in stroke incidence is unknown, despite the well-documented impact of risk factors such as hypertension and atrial fibrillation.⁴ Elevated blood cholesterol has been linked to ischemic stroke in several clinical trials, but its relationship to intracerebral hemorrhage (ICH) is unclear.⁵ Only a small number of research have identified hypercholesterolemia as a risk factor for ICH.⁶

According to the World Health Organization (WHO), stroke is one of the top causes of mortality and disability worldwide, affecting around 15 million people annually and accounting for about 5 million fatalities⁷. Stroke is a major health concern in Asia because of the high prevalence of risk factors such as high blood pressure, high cholesterol, and lifestyle choices. Although precise prevalence rates vary dramatically because of variances in healthcare accessibility, demography, and lifestyle choices, it significantly contributes to total mortality rates in many Asian nations.⁸ Stroke is a significant health issue in Pakistan that contributes to both death and disability.⁹ 2014 research found that a significant portion of Pakistani people had modifiable risk factors for stroke, including dyslipidemia and hypertension. On the other hand, there may not be much consolidated and thorough statistics on the occurrence of stroke throughout the nation.¹⁰⁻¹¹ Precise stroke prevalence figures for Khyber Pakhtunkhwa (KPK) may be not widely known or accessible. However, considering Pakistan's overall health situation, it is conceivable that KPK has a high rate of stroke cases that are impacted by comparable risk factors that are common in the nation.

Particularly in the elderly, stroke not only aggravates existent dementia and cognitive impairment but also causes it. Nonetheless, there are difficulties in Pakistan due to the lack of consolidated data and the paucity of research on stroke risk factors in the native population.¹¹ Atherosclerosis was shown to be a prevalent cause

of the high prevalence of modifiable risk factors, such as dyslipidemia and hypertension, among Pakistanis, according to 2014 research.¹¹ In addition, older patients have higher adjusted risks of death as well as a higher chance of problems that need longer hospital admissions.

The complex correlation between lipid levels and subtypes of stroke adds to the complexity of the situation since studies have shown inconsistent results. According to some studies, a significant portion of stroke patients have aberrant lipid profiles, with differences between ischemic and hemorrhagic strokes noted.¹² The association between cholesterol and stroke, particularly hemorrhagic stroke, presents an inverse relationship, distinct from the direct link seen in coronary heart disease. Understanding these distinctions is crucial to tailoring lipid-lowering therapies effectively, potentially reducing stroke incidence and related mortality rates.¹³

This study aims to evaluate lipid profile variations among stroke patients, specifically comparing ischemic and hemorrhagic stroke cases. Identifying aberrations in lipid profiles associated with stroke can aid national control programs in strategizing targeted preventive measures, thereby alleviating the stroke burden in a country-specific context.

MATERIALS & METHODS

Study Design & Setting

This descriptive cross-sectional research was carried out at the Lady Reading Hospital in Peshawar's Department of Medicine, from June 22, 2021, to December 21, 2021.

Sample Size and Sampling Technique

A total of 96 patients were enrolled in the study using a non-probability, sequential sampling method.

Inclusion Criteria

Patients with strokes lasting less than 48 hours, ages ranging from 30 to 70, and either gender were included in the inclusion criteria.

Exclusion Criteria

Those on cholesterol-lowering medications, those with head trauma, people with main or secondary brain tumors, people with chronic liver disease, and people with liver failure were also excluded.

Data Collection

Demographic information and clinical characteristics, such as age, gender, length of stroke, hypertension, diabetes mellitus, BMI, smoking status, and place of residence, were gathered after receiving ethical permission and informed consent. Lipid profiles of blood samples were evaluated in the institutional pathology laboratory after collection.

A specially created form questionnaire was used to record the data that was gathered.

Data Analysis

SPSS version 25.0 was used to analyze the data. Age, the length of the stroke, BMI, and cholesterol levels were all measured using descriptive statistics like mean and standard deviation. Frequencies for categorical factors such as disordered lipid profiles, smoking, hypertension, diabetes, and gender were shown.

A p-value of less than 0.05 was deemed significant when comparing the aberrant lipid profiles in ischemic and hemorrhagic strokes using the chi-square test. Furthermore, stratification based on age, gender, stroke duration, BMI, diabetes, hypertension, smoking, and place of residence was incorporated into the study.

Their impact on the incidence of disordered lipid profiles was assessed using the chi-square test after stratification; a p-value of less than 0.05 was deemed significant.

RESULTS

The research participants' demographic and clinical characteristics are shown in Table 1. Age, gender, length of illness, body mass index (BMI), and abnormal lipid markers are among the factors.

Gender Distribution

In the age range of 30 to 50, there were 44 participants (45.83%), and in the age category of 51 to 70, there were 52 participants (54.17%). Of the participants, 41.67% were women and 58.33% were men.

Age Distribution

45% of patients were in 30-50 years, and 54% were in 51-70 years of age.

Clinical Parameters

In terms of how long the illness lasted, 29 people (30.21%) had a disease duration longer than 6 hours, while 67 participants (69.79%) had a disease duration of 6 hours or less. 77 individuals (80.21%) had a body mass index (BMI) of less than 30, while 19 participants (19.79%) had a BMI of 30 or higher.

Participants showed the following deranged lipid parameters: disordered total cholesterol (41.67%), deranged triglyceride levels (53.13%), deranged HDL (high-density lipoprotein) (25.0%), and deranged LDL (low-density lipoprotein) (21.88%).

Distribution of Confounding Variables

The distribution of confounding factors among study participants is shown in Table 2. Of the subjects, 37.50% had hemorrhagic strokes and 62.50% suffered ischemic strokes. When it came to living arrangements, 62.50% of participants lived in rural regions and 37.50% in urban areas. 52.08% of the subjects did not have diabetes mellitus, while almost half

(47.92%) did. 66% of the patients had a diagnosis of hypertension, while 25.0% said they smoked. The study's investigation of factors connected to stroke included these variables as possible confounders.

Table 2: Distribution of Confounding Variables.

Confounding Variables	Sub-groups	Frequency	%age
Type of stroke	Ischemic	60	62.50
	Hemorrhagic	36	37.50
Place of living	Rural	60	62.50
	Urban	36	37.50
DM (Diabetes mellitus)	Yes	46	47.92
	No	50	52.08
HTN (Hypertension)	Yes	61	63.54
	No	35	36.46
Smoking	Yes	24	25.0
	No	72	75.0

Comparison of Variables

Table 3 presents a comparison of many factors between patients with and without the condition. There was no discernible difference between the present and absent instances in the age group distribution (30–50 and 51–70 years; $p = 0.579$) and gender group ($p = 0.576$). A tendency toward significance was seen between instances that lasted six hours or less and those that lasted more than six hours ($p = 0.077$). Between the present and

Table 1: Demographic and Clinical Characteristics of Study Participants (n=96).

Variable	Sub-groups	Frequency	Percentage
Age (in years)	30-50	44	45.83
	51-70	52	54.17
Gender	Male	55	58.33%
	Female	40	41.67%
Duration of disease (in hours)	≤6	67	69.79
	>6	29	30.21
BMI (in kg/m ²)	<30	77	80.21
	≥30	19	19.79
Deranged lipid parameters	Deranged total cholesterol	40	41.67
	Deranged triglyceride	51	53.13
	Deranged HDL	24	25.0
	Deranged LDL	21	21.88

absent cases, there was no discernible change in the BMI categories (≤ 30 and > 30) ($p = 0.319$), DM ($p = 0.729$), hypertension ($p = 0.858$), smoking ($p = 0.633$) and residency ($p = 0.199$) and strokes (hemorrhagic and ischemic) ($p = 1.000$).

DISCUSSION

The conventional risk factors for dyslipidemia, hypertension, diabetes, and coronary artery disease include smoking.¹⁴ However, the evidence linking these risk factors to stroke is not as strong as it is for coronary artery disease. Smoking and hypertension are the two most significant risk factors. More debatable is how diabetes affects the risk of stroke.¹⁵ Austin et al. provided the first definition of the term atherogenic dyslipidemia. This ranges from low HDL cholesterol to high triglycerides and elevated LDL cholesterol.¹⁶ Epidemiological research has conclusively shown that low HDL-C and elevated LDL-C are linked to cardiovascular disease.¹⁷⁻¹⁸ The purpose of this research is to ascertain how often patients who have had strokes at Lady Reading Hospital in Peshawar have abnormal lipid profiles.

The study included participants ranging in age from 30 to 70, with a mean age of 53 years. The age range of 51 to 70 was occupied by the bulk

of the 52 patients (54.17%). Of the 96 patients, 40 (41.67%) were female and 56 (58.33%) were male, resulting in a male-to-female ratio of 1.4:1. In our research, 40 individuals (41.67%) had a frequency of abnormal lipid profiles in stroke patients. Of the stroke patients, 41.67% had abnormal total cholesterol, 53.13% abnormal LDL cholesterol, 25.0% abnormal triglyceride levels, and 21.88% abnormal HDL cholesterol. Research indicated that 54.0% of stroke patients had an abnormal lipid profile.¹⁸ In 20% of hemorrhagic stroke cases and 80% of ischemic stroke cases, total cholesterol was abnormal. In 16.6% of hemorrhagic stroke cases and 83.3% of ischemic stroke cases, there was abnormal LDL cholesterol.

Triglyceride levels were abnormal in 29.5% of instances of hemorrhagic stroke and 70.5% of cases of ischemic stroke. An abnormal HDL cholesterol level was present in 26% of instances of hemorrhagic stroke and 74% of cases of ischemic stroke (p-value <0.05). In another study,¹⁸⁻¹⁹ aberrant total cholesterol was discovered in 18.8% of instances of hemorrhagic stroke and 39.1% of cases of ischemic stroke. Abnormal low-density lipoprotein (LDL) cholesterol was found in 29.7% of ischemic stroke patients and 9.4% of hemorrhagic stroke cases. Triglyceride levels were abnormal in 25.0% of ischemic stroke cases and 12.5% of hemorrhagic stroke cases. Abnormal HDL cholesterol levels were seen in 53.1% of instances of hemorrhagic stroke and 73.4% of cases of ischemic stroke. Conversely, in 1,008 young stroke patients in Finland, smoking (44%), dyslipidemia (60%), and hypertension (39%), were the most common vascular risk factors.

Table 3: Comparison of Variables Between Present and Absent Cases

Parameters		Present (n=40)	Absent (n=56)	P-value
Age (years)	30-50	17 (38.64%)	27 (61.36%)	0.579
	51-70	23 (44.23%)	29 (55.77%)	
Gender	Male	22 (39.29%)	34 (60.31%)	0.576
	Female	18 (45.0%)	22 (55.0%)	
Duration (hours)	≤6	24 (42.11%)	43 (57.89%)	0.077
	>6	16 (55.17%)	13 (44.83%)	
BMI (kg/m ²)	≤30	34 (44.16%)	43 (55.84%)	0.319
	>30	06 (31.58%)	13 (68.42%)	
DM	Yes	20 (43.48%)	26 (56.52%)	0.729
	No	20 (40.0%)	30 (60.0%)	
HTN	Yes	25 (40.98%)	36 (59.01%)	0.858
	No	15 (42.86%)	20 (57.14%)	
Smoking	Yes	11 (45.83%)	13 (54.17%)	0.633
	No	29 (40.28%)	43 (59.72%)	
Place of living	Rural	18 (50.0%)	18 (50.0%)	0.199
	Urban	22 (36.67%)	38 (63.33%)	
Type of stroke	Ischemic	25 (41.67%)	35 (58.33%)	1.000
	Hemorrhagic	15 (41.67%)	21 (58.33%)	

In another investigation, Putaala et al. looked at the vascular risk factor distribution across 3,944 young stroke patients from three different European geographic areas.²⁰ The three risk factors that were most often reported were hypertension (36%), dyslipidemia (46%), and current smoking (49%). Findings from the Athens Young Stroke Registry on 253 consecutive patients under 45 years of age who had their first ischemic stroke revealed that smoking (59%) and dyslipidemia (41%) were the most common vascular risk factors.²¹ Dyslipidaemia and the risk of stroke have a complicated connection; raised total cholesterol increases the risk of ischemic stroke, but elevated high-density lipoprotein cholesterol lowers the risk of ischemic stroke²²⁻²³. There is contradictory evidence about the impact of triglycerides on the risk of stroke. Furthermore, risk seems to vary according to the kind of stroke, with cholesterol

levels having a higher correlation with big artery ischemic stroke than with other forms of ischemic stroke.

Hemorrhagic stroke risk is inversely correlated with total cholesterol, meaning that a reduction in total cholesterol increases the risk of hemorrhagic stroke.²⁴ The fact that certain observational studies have not demonstrated an increased risk of intracerebral hemorrhage with statin medication, while other treatment trials have, further complicates the evidence on lipids and intracerebral hemorrhage.²⁵ While these studies show potentially inconsistent and contradictory findings between dyslipidemia and the risk of ischemic and hemorrhagic stroke, overall, statin use appears to reduce the risk of total and ischemic stroke with no appreciable increase in the risk of hemorrhagic stroke in the general patient population.²⁶ Moreover, for the majority of patients, the rather little increase in bleeding risk is outweighed by the comparatively large reduction in the risk of ischemic stroke and other ischemic events linked to statins.

Statins, however, may be linked to an increased risk of intracerebral hemorrhage in some stroke patients, especially those with small artery disease, cerebral amyloid angiopathy, or a history of bleeding.²⁷ According to Togha et al, there is a positive correlation between rising total cholesterol and LDL levels and an increased risk of ischemic stroke. The incidence of ischemic stroke increased with cholesterol levels over 200 mg/dl and more than doubled when serum cholesterol readings went beyond 280 mg/dl, according to the MRFIT research, which also revealed an inverse relationship between cholesterol level and hemorrhagic stroke²⁸. Japanese research supports the fact that high cholesterol levels are protective against hemorrhagic stroke. as well as research by Jayachandran et al.²⁸ However, there is also data to suggest that blood cholesterol levels have no impact on the risk of stroke(29). Elevations in LDL cholesterol have consistently been associated with

an increased risk of both ischemic and hemorrhagic stroke.³⁰

According to Khan et al,³¹ the leading risk factors for stroke were determined to be smoking (32%), DM (31.3%), dyslipidemia (32.7%), and hypertension (65%). This study's stated prevalence of hypertension is less than that of Desalu et al's 86.5% in South-West Nigeria and Eze et al's, 76% in Abakaliki, South-Eastern Nigeria.³² According to Ogun et al., the prevalence of DM in North-Eastern Nigeria was 8%; however, Desalu et al. showed that DM was found in South-West Nigeria at 23.8%, where it was ranked second. The prevalence of DM in this research is 15.1%.³³ According to Mirghan & Zein, 65% of ischemic stroke patients in the Emirates had dyslipidemia.³⁴ Asghar Kamal and associates looked at stroke risk factors.³⁵ The patient's average age was 63.42 years. Sixty percent had hypertension, twenty percent had diabetes mellitus, eighteen percent had hyperlipidemia, sixteen percent had cigarette smoking, and sixteen percent had cardiovascular disease.

Khan et al. assessed the risk factors for stroke and discovered that smoking was 5.5%, hyperlipidemia was 3.3%, ischemic heart disease was 12.1%, diabetes was 15.4%, and hypertension was 46.2%(36). In a research conducted in Karachi, Niaz Ahmed Shaikh et al¹⁸⁴ found that 19.65% of patients with ischemic stroke had hyperlipidemia. Balci Kemal et al. assessed risk variables for ischemic stroke in young individuals (18 to 47 years old) in recent research.³⁷ The primary risk factor was determined to be hypertension (45%), which was followed by hyperlipidemia (35.4%), diabetes mellitus (17%), smoking (37%), and a family history of stroke (18%). In most patients, the following conditions were present either alone or in combination: smoking, hypercholesterolemia, diabetes mellitus, and hypertension.

CONCLUSION

According to the study's findings, a very high prevalence of abnormal lipid profiles occurs in stroke patients. To lower community mortality and morbidity early detection and treatment of dyslipidemia is advised. To lower the number of cerebrovascular accidents (CVA) and their consequences, public awareness campaigns for early dyslipidemia screening and treatment might be organized at the national and local levels based on the findings of this research.

LIMITATION

Essentially, it was a single-center study, and the stroke patients we included were also quite particular, so the small sample size demonstrates a quick and early conclusion as a roadmap for doctors and future research.

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Additional Information

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Conflicts of Interest:

In compliance with the ICMJE uniform disclosure form, all authors declare the following:

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AUTHORS CONTRIBUTIONS

Sr.#	Author's Full Name	Intellectual Contribution to Paper in Terms of:
1.	Naseem Ur Rehman& Muhammad Bilal	1. Study design and methodology.
2.	Syed Ahmad Shah & Adeela Masood	2. Paper writing.
3.	Naseem Ur Rehman & Muhammad Imran	3. Data collection and calculations.
4.	Syed Ahmad Shah& Muhammad Imran	4. Analysis of data and interpretation of results.
5.	Naseem Ur Rehman & Adeela Masood	5. Literature review and referencing.
6.	Muhammad Bilal & Adeela Masood	6. Editing and quality insurer.