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FREQUENCY OF HYPERLIPEDEMIA IN PATIENTS COMING WITH ISCHEMIC STROKE IN TERTIARY CARE HOSPITAL KARACHI

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ABSTRACT

Background and objective:

Stroke is the second leading cause of death and the third leading cause of disability. This study was designed to determine the frequency of hyperlipidemia in patients with ischemic stroke visiting at a tertiary care hospital in Karachi.

Methods:

This was a descriptive cross-sectional study and was done in Department of Medicine, LCMD/ Dar-ul-Sehat Hospital Karachi, Pakistan. A total of 184 patients were studied during the study period of six months and all the consecutive patients were recruited who presented with acute stroke in the department of medicine from the duration April 1st 2022 to September 30th, 2022. Those fulfilling the inclusion criteria for this study were included for data analysis, while the patients who did not meet the said criteria were excluded. Their serum lipid levels were collected within 24 hours of admission. Hyperlipidemia was measured through fasting lipid profile and was labeled as present if any one or more of the following profile like total cholesterol >200 mg/dl, LDL cholesterol > 100 mg/dl, TGL > 150 mg/dl, HDL cholesterol < 40 mg/dl, as appropriate.

Results:

The mean age of the patients was 65.17 ± 12.73 . Average systolic and diastolic blood pressure was 152.34 ± 21.31 & 83.35 ± 13.71 mm Hg respectively. Mean duration of smoking and diabetes mellitus in first ever ischemic stroke patients was 9.33 ± 4.03 & 13.65 ± 5.8 years respectively, whereas average fasting blood sugar was found 151.98 ± 69.73 mg/dl; 118 (64%) were males and 66 (36%) were females. A total of 124 (67.4%) of patients had a history of hypertension, while 94 (51.1%) were diabetic. Fifty-three (28.8%) of patients had a history of coronary artery disease while 22 (11.95%) patients had history of smoking. Increased triglycerides level was seen in 47 (25.5%). The frequency of hyperlipidemia was 145 (79%) patients respectively.

Conclusion: Frequency of hyperlipidemia was 145 (79%) in patients with ischemic stroke which is moderately high in our setup. A high prevalence of hyperlipidemia is alarming in our setup and requires attention of the physicians on modifiable risk factors.

Keywords:

Ischemic stroke, Hyperlipidemia, Serum cholesterol, Serum triglycerides, LDL

INTRODUCTION

Stroke is the most common life-threatening neurological disorder and an important cause of disability as well. Both in the developed and developing countries year 2020 World Health Organization (WHO) estimated that stroke remained the leading cause of death after ischemic heart disease.¹ During the last

three decades stroke incidence declined in the western population but inclined in South Asian countries (India, Pakistan, Bangladesh and Sri Lanka) and is expected to rise further.² In Pakistan, stroke incidence is estimated to be 250 per 100,000 population, which means that there are approximately 350,000 new stroke patients every year.³ Non-modifiable risk factors are age,

gender, family history, race and ethnicity, while modifiable risk factors include hypertension, cardiac disease, diabetes mellitus, tobacco usage, alcohol abuse, physical inactivity, carotid stenosis and transient ischemic attack.⁴ Hyperlipidemia has been considered one of the important risk factors of stroke in the causation of ischemic stroke.^{5,6}

A study carried out in Lahore revealed frequency of hyperlipidemia in ischemic stroke patient's i.e. 26.2% had increased cholesterol levels, 20.1% had hypertriglyceridemia and 16.8% had high LDL levels. Frequency of hyperlipidemia in patients presenting with ischemic stroke was 37.1% in another study conducted in Multan on 178 patients.⁷

Hyperlipidemia is an important risk factor for occurrence of stroke; our main aim is to assess the prevalence of hyperlipidemia in tertiary care hospitals in Karachi as many studies have been done in Pakistan but mostly level of low density lipoproteins or triglyceride levels have been the main point of concern however in our study we have studied the whole lipid profile and also looked into the levels of high density lipoproteins which act as cardio protective as well as a protective agent for stroke. There is a dearth of reliable figures for the prevalence of hyperlipidemia in Pakistan. This study looked at common treatment modalities related to stroke. Quantifying the burden of hyperlipidemia will enable us to plan the distribution of resources and allow us to focus on important risk factors, so that contributing factors towards stroke can be adequately controlled.

METHODS

Study design: Cross-sectional study.

Place and duration of study: This was a cross-sectional study conducted at the Department of Medicine LCMD/ Dar-ul-Sehat Hospital Karachi, Pakistan. The duration of study was six months from April 1st 2022 to September 30th 2022.

Sample size: Total number of 183 patients were enrolled in the study. The required sample size was calculated using WHO software version by Peter Chiam and KC Lun Singapore University.

Sampling technique: Non-probability, consecutive sampling technique.

Inclusion criteria: Consenting patients between 40-80 years age of either gender diagnosed with

ischemic stroke presenting for more than 24 hours in emergency department were included in the study.

Exclusion criteria: The exclusion criteria included patients suffering from any other endocrinological disorder (e.g. Cushing syndrome, Addison disease), patients with advanced hepatic or renal insufficiency and patients with recent blood transfusion or a haemoglobinopathy (on history and medical record).

Data collection: Brief history was taken for the duration of diabetes mellitus, hypertension, lipid profile and smoking from all stroke patients. Hyperlipidemia was measured through fasting lipid profile and was labeled as present if any one or more of the following: total cholesterol >200 mg/dl, LDL cholesterol >100 mg/dl, TGL > 150 mg/dl, HDL cholesterol < 40 mg/dl.

Data analysis: SPSS-22 was used for data analysis. Mean±SD or Median (IQR) in case data found not normally distributed were calculated for age, dyslipidemia, systolic/diastolic blood pressure, duration of smoking and duration of diabetic mellitus, fasting blood sugar level and fasting lipid profile. Frequency and percentages were calculated for gender, hypertension, diabetes, smoking status, dyslipidemia, education status and economic status and hyperlipidemia as appropriate. Stratification were done for modifier factors of age, gender, smoking status, ischemic heart disease, hypertension diabetic mellitus, education status and economic status to see the effect on outcome of hyperlipidemia; chi square test/fisher exact test was applied. Significance value $p \leq 0.05$ was taken as significant.

Ethical considerations: This study was approved by institutional review board of LCMD/ Dar-ul-Sehat Hospital Karachi, Pakistan.

RESULTS

The mean age of the patients was 65.17 ± 12.73 years. The minimum age was 33 and maximum was 101 years. Average systolic and diastolic blood pressure were 152.34 ± 21.31 & 83.35 ± 13.71 mm Hg respectively. Mean duration (in years) of smoking was 9.33 ± 4.03 whereas average fasting blood sugar (in first ever ischemic stroke patients) was 151.98 ± 69.73 mg/dl. (Table 1).

Table 1 Descriptive statistics of fasting blood sugar, smoking and diabetes

Descriptive Statistics	Smoking Duration (in Years)	Diabetic Duration (In Years)	Fasting bloodsugar level (mg/dl)
Count	184	184	184
Range (Max-Min)	15 (20-5)	23 (27-4)	395 (396-1)
Median	10	12	127.5
Mean±SD	9.33±4.03	13.65±5.8	151.98±69.73

Gender distribution is given in Figure 1. Total of 124 (67.4%) patients had history of hypertension & diabetes mellitus was seen in 94 (51.1%) patients; 53 (28.8%) patients had history of coronary artery disease while 22 patients had current or recent history of smoking. Triglyceride level was seen high in 47 (25.5%) patients (Table 2). Figure 2 elaborates the effect modifier of the study i.e. diabetes/ hypertension/ smoking etc. Patients' age was divided into two categories, the most common belonged to the age group who were <65 years of age i.e. 96 (52%) while 88 (48%) patients were found of more than 65 years. There were 32 (17%) patients with low income, 118 (64.10%) middle and 34 (18.5%) had upper income strata.

GENDER DISTRIBUTION

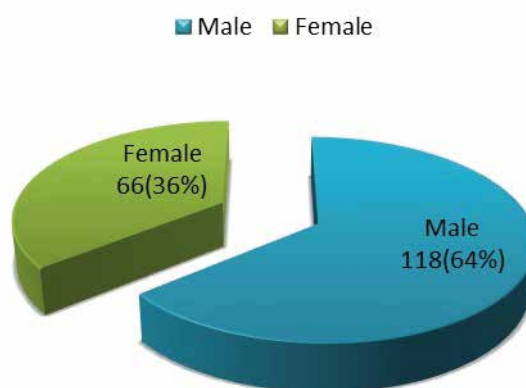


Figure 1: Gender Distribution

CLASSIFICATION OF EFFECT MODIFIER OF THE STUDY

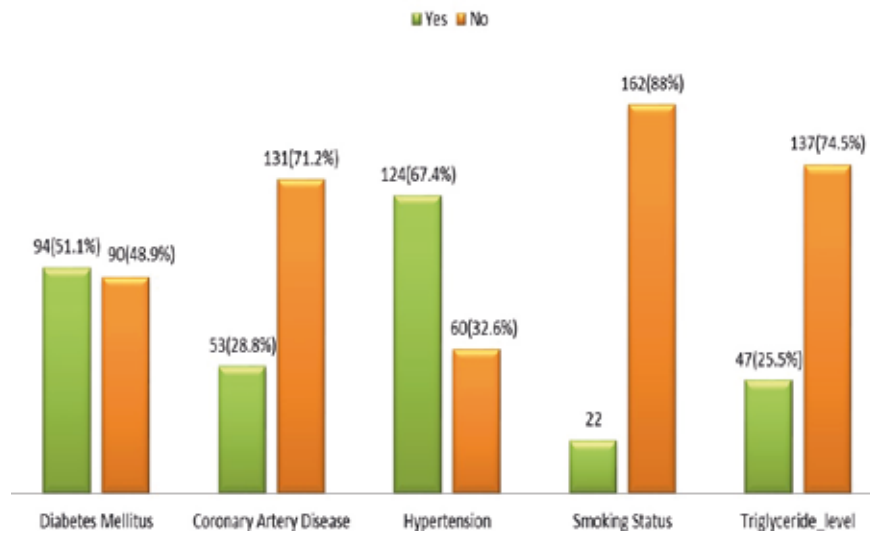


Figure 2: Classification of effect modifier of the study

Table 2: Descriptive statistics of dyslipidemia in patients with ischemic stroke

Descriptive Statistics	Total Cholesterol (mg/dl)	TGL (Triglyceride) (mg/dl)	LDL (low density lipoprotein cholesterol) (mg/dl)	HDL (high density lipoprotein cholesterol) (mg/dl)	VLDL (very low density lipoprotein cholesterol) (mg/dl)
Count	184	184	184	184	184
Range (Max-Min)	281 (334-53)	485 (524-39)	230 (252-22)	95 (106-11)	97 (105-8)
Median	146	100.5	90	36	19
Mean±SD	154.16±46.87	124.2±73.55	94.85±38.91	37.39±12.91	24.37±13.23

Fasting lipid profile was abnormal in 145 (79%) patients i.e. who had one or more of level of total cholesterol >200 mg/dl, LDL cholesterol > 130 mg/dl, TGL > 150 mg/dl, HDL cholesterol < 40 mg/dl. Stratification were done for modifier factors of age, gender, smoking status, ischemic heart disease, hypertension diabetic mellitus, education status and economic status be done to see the effect on outcome of hyperlipidemia, chi square test/fisher exact test was applied (Table 3).

Table 3: Comparison of outcome variable hyperlipidemia with confounding variables in Patients with ischemic stroke

Stroke Risks/ Modifier	Hyperlipidemia			P-value
	Present	Absent	Total	
Diabetes Mellitus				
Yes	79 (42.9%)	15 (8.2%)	94 (51.1%)	0.076
No	66 (35.9%)	24 (13%)	90 (48.9%)	
Total	145 (78.8%)	39 (21.2%)	184 (100%)	
Coronary Artery Disease				
Yes	47(25.5%)	6 (3.3%)	53 (28.8%)	0.037*
No	98 (53.3%)	33 (17.9%)	131 (71.2%)	
Total	145 (78.8%)	39 (21.2%)	184 (100%)	
Hypertension				
Yes	108 (58.7%)	16 (8.7%)	124 (67.4%)	0.001*
No	37 (20.1%)	23 (12.5%)	60 (32.6%)	
Total	145 (78.8%)	39 (21.2%)	184 (100%)	
Smoking Status				
Yes	19 (10.3%)	3 (1.6%)	22 (12%)	0.355
No	126 (68.5%)	36 (19.6%)	162 (88%)	
Total	145 (78.8%)	39 (21.2%)	184 (100%)	
Triglyceride Level				
Yes	47 (25.5%)	0 (0%)	47 (25.5%)	0.001*
No	98 (53.3%)	39 (21.2%)	137 (74.5%)	
Total	145 (78.8%)	39 (21.2%)	184 (100%)	

DISCUSSION

Stroke is one of the leading cause of functional impairment, with 20% of survivors even after three months requiring institutional care and 15% to 30% becoming permanently disabled. Stroke is an event that affects not only the person who may be disabled after stroke, but also the entire family or caregivers. Stroke prevalence worldwide in 2019 was 101.5 million, with 77.2 million ischemic strokes. Ischemic strokes caused 3.3 million deaths worldwide in 2019.⁸ Moreover, although decline in the incidence of the disease burden reported in the western population, but that in South Asian countries (India, Pakistan, Bangladesh, and Sri Lanka) an increase is reported and is expected to increase further.^{9,10}

Cholesterol plays vital role in the development of small vessel disease. Some other studies had shown all-cause mortality to be inversely related to cholesterol i.e. higher cholesterol was associated with lower all-cause mortality and vice versa, although the reason for these results remained unclear.^{11,12} In our study we did not cater the other confounding factors i.e. age, presence or absence of modifiable risk factors e.g. smoking, HTN, DM, IHD, diet and dyslipidemia. All of these factors can have an independent as well as combined effects on stroke recovery which is actually difficult to measure.

Hypertension stands out to be the a significant modifiable risk factor for ischemic stroke i.e. greater than 80% had multiple risk factors among which the hypertension was found to be the highest 55%.¹³ The percentage of patients with hyperlipidemia has been reported as 16% in healthy individuals and 68% in obese individuals.¹⁴

Our study results are comparable to the available recent study by Khan R et al.¹⁵ Mean age of the patients was taken as 53.09 years. The important risk factors were hypertension (64.42%), diabetes mellitus

(48.08%) and hyperlipidemia (39%). Hamzullah Khan et al. evaluated risk factors of stroke and found frequency of hypertension as 46.2%, diabetes 15.4%, ischemic heart disease 12.1%, smoking 5.5% and hyperlipidemia 3.3%.¹⁶ In another study Balci Kemal et al evaluated risk factors for ischemic stroke amongst young patients (18 to 47 years) in which hypertension was the main risk factor (45%) followed by smoking 37%, hyperlipidemia 35.4%, diabetes mellitus 17% and history of stroke in family (18%).¹⁷

A study done in France and South Korea involved patients with ischemic stroke or TIAs with existing atherosclerotic disease, the results showed mean LDL cholesterol level 92mg/dl and the included patients had a 13% risk of major cardiovascular event at five years, suggesting that LDL levels of less than 70 mg/dl provided prevention from vascular event.¹⁸

Some other risk factors include smoking, inactivity, poor diet, excessive or frequent alcohol consumption, and illicit drug use (such as amphetamines, cocaine, and heroin, for example). The SIFAP1 study (Stroke in Youthful Fabry Patients) tracked down that actual latency, hypertension, rambling weighty liquor utilization, and smoking were the main gamble factors for stroke in their investigation of grown-ups matured 18 to 55 years (middle age, 48 years).¹⁹

Another study found history of hyperlipidemia was present in 451 patients (32.6%) with stroke. Among 930 patients enrolled during study without history of hyperlipidemia, 739 (79.5%; 95% CI: 76.8-82.1) were diagnosed with hyperlipidemia.²⁰

CONCLUSION

Frequency of hyperlipidemia was 145 (79%) in patients with ischemic stroke which was moderately high in our setup. A high prevalence of hyperlipidemia was alarming in our setup and requires attention of the physician on modifiable risk factors.

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Authors' contribution:

Bushra Ammad; Design, data collection, data analysis, manuscript writing

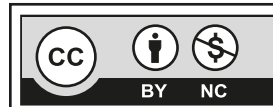
Abdul Malik; Concept, data analysis, manuscript writing

Rabia Sana Muhammad; Concept, manuscript revision

Maryam Javed; Data interpretation, manuscript revision

Hina Imtiaz; data collection, manuscript writing

All the authors approve the final version to be published, and agree to be accountable for all aspects of the work.



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