ORIGINAL ARTICLE

Frequency of Hyperlipidemia in Patients Presenting with Ischemic Stroke

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ABSTRACT

Objective: To determine frequency of hyperlipidemia in patients presenting with ischemic stroke.
Study design: Cross sectional study.
Place and duration of study: Department of Medicine Unit I, Nishtar Hospital Multan.
Six months from 5th October 2010 to 4th April 2011.
Methodology: One hundred and seventy eight patients fulfilling inclusion criteria were selected through Emergency Department after identification of clinical features of stroke including sudden onset of dizziness, double vision or eye movement abnormalities, weakness affecting leg or arm or sensory loss for pain and touch on affected side confirmed on CT. All the patients were having fasting lipid profile [serum triglycerides, low density lipoprotein (LDL), very low density lipoprotein (VLDL), and high density lipoproteins (HDL)], blood sugar levels, fasting lipid profile and serum homocystein levels. These were obtained from central laboratory, Nishtar hospital Multan by providing blood sample. Findings of these were noted in proforma.
Results: Frequency of hyperlipidemia in our study was 37.1%. Frequency of diabetes mellitus was 9.6% whereas frequency of hypertension was 10.1%.
Conclusion: Frequency of hyperlipidemia was 37.1% in patients with ischemic stroke which is quite high in our set up.
Key words: Ischemic stroke, hyperlipidemia, serum cholesterol, serum triglycerides

INTRODUCTION

Stroke (CVA) is a clinical syndrome characterized by rapidly developing symptoms and/or signs of focal and at times global (for patients in coma) loss of cerebral functions, with symptoms lasting more than 24 hours or leading to death with no apparent cause other than that of vascular origin[1]. According to World Health Organization (WHO) report 2002, total mortality due to stroke in Pakistan was 78512[2] WHO estimates for the year 2020, predicts that stroke will remain the second leading cause of death after ischemic heart disease, both in developed and developing countries[3]. A previous epidemiological study on stroke in Taiwan demonstrated that the average annual incidence of first ever stroke in the age group 36–44 year was 26 per 100,000[4]. Annually, 15 million people worldwide suffer a stroke. Of these 5 million die and another 5 million left permanent disabile, placing a burden on community[5].

Clinically stroke is the result of a disturbance of cerebral circulation, either due to occlusion of main blood vessel due to thrombo-embolism or rupture of a blood vessel. About 85% of all strokes are of ischaemic origin, caused by thrombotic or embolic blockage of a cerebral artery[6].

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Multiple risk factors are associated with Stroke. The Non-modifiable risk factors are age, sex, family history, race and ethnicity and the modifiable risk factors include hypertension, cardiac disease, diabetes mellitus hyperlipidaemia, cigarette smoking, alcohol abuse, physical inactivity, carotid stenosis, and transient ischaemic attack[7].

Stroke is uncommon in age below 40 years, when it does occur, the main cause is high blood pressure. The proportion of major risk factors for stroke include high blood pressure (35%)[8], diabetes mellitus (32.5%)[9] hyperlipidemia (35%)[8] obesity (18%)[10], tobacco (37%)[8] and alcohol use (22.5%)[9], cardiac diseases (14%)[8] e.g. arterial fibrillation and coronary artery disease, homocysteinuria, migraine with aura,[11] past history of CVA, recreational drug abuse, family history of stroke and oral contraceptive pills[12] are also important risk factors for stroke.

Hyperlipidemia has been considered one of the important risk factors of stroke in the causation of ischemic stroke[13]. Previous data exists on the determinants of stroke risk in Pakistan in various part of the country. The contribution of various risk factors for stroke may be different in different ethnicities. Since stroke is often crippling, and the impact of treatment on the prognosis is limited, the potential to control the disease lies in its primary prevention.

The proposed study was conducted at Nishtar Hospital Multan which is a tertiary care hospital providing major health facilities in Southern Punjab. As hyperlipidemia is an important cause of stroke, this study would enable us to plan management of such patients timely and formulate guidelines to prevent hyperlipidemia which is a leading cause of stroke.

METHODOLOGY

One hundred and seventy eight patients fulfilling inclusion criteria were selected through Emergency Department after identification of clinical features of stroke including sudden onset of dizziness, double vision or eye movement abnormalities, weakness affecting leg or arm or sensory loss for pain and touch on affected side confirmed on CT.

Informed consent was obtained from the patients/attendants describing them procedures of the study ensuring confidentiality and fact that there is no risk involved to the patient while taking part in this study. Permission was also taken from Ethical Committee of the institution.

All the patients were having fasting lipid profile [serum triglycerides, low density lipoprotein (LDL), very low density lipoprotein (VLDL), and high density lipoproteins (HDL)], blood sugar levels, fasting lipid profile and serum homocystein levels. These were obtained from central laboratory, Nishtar hospital Multan by providing blood sample.

All the information were recorded in a specifically designed proforma by the researcher including outcome variable i.e. hyperlipidemia (Yes, No).

The data were entered and analyzed using computer programme SPSS version 10. Descriptive statistics were applied to calculate mean and standard deviation for age, triglyceride level, serum cholesterol, LDL and HDL levels. Frequencies and percentages were calculated for gender and hyperlipidemia. Effect modifiers like age, gender, diabetes mellitus and hypertension were controlled by stratification.

RESULTS

This study was conducted on 178 patients with ischemic stroke. Age at presentation of the stroke patients was highest in the age group 60–79 years i.e. 73(41.0%), followed by 63(35.4%) patients who were between 40–59 years of age. There were 25(14%) patients of age 20–39 years and 17 patients (9.6%) were of the age 80 or above (Table 1). Age range of the patients was 20–100 years. Mean age at presentation was 55.96±15.76 years as mentioned in Table 5. There were 86(48%) male and 92(52%) females (Fig. 1). Frequency of hyperlipidemia in our study was 37.1% as mentioned in Table 2. Frequency of diabetes mellitus was 9.6% (Table 3), whereas frequency of hypertension was 10.1% (Table 4). Descriptive statistics showed that mean serum cholesterol was 201.14±44.87(mg/dl), mean serum triglyceride was 159.20±27.10 (mg/dl), serum low density lipoprotein was 98.65±33.65 (mg/dl) and High density lipoprotein was 65.36±15.87 (mg/dl) as shown in Table 5. Out of total 25 patients of age 20–39 years, 2(8%) had hyperlipidemia, out of total 63 patients of age 40–59 years, 26(41.3%) had hyperlipidemia, out of total 73 patients of age 60–79 years, 31(42.5%) had hyperlipidemia and out of total 17 patients of age 80 and above, 7(41.2%) had hyperlipidemia (Table 6). Out of total 86 male with ischemic stroke, 29(33.7%) had hyperlipidemia, and out of total 92 females with ischemic stroke, 37(40.2%) had hyperlipidemia (Table 7)

Table 1: Age distribution of patients presenting with ischemic stroke (n=178)

Age (in years)	=n	%age
20 — 39	25	14.0
40 — 59	63	35.4
60 — 79	73	41.0
80 and above	17	9.6

Fig. 1**:** Gender distribution of patients presenting with ischemic stroke (n=178)

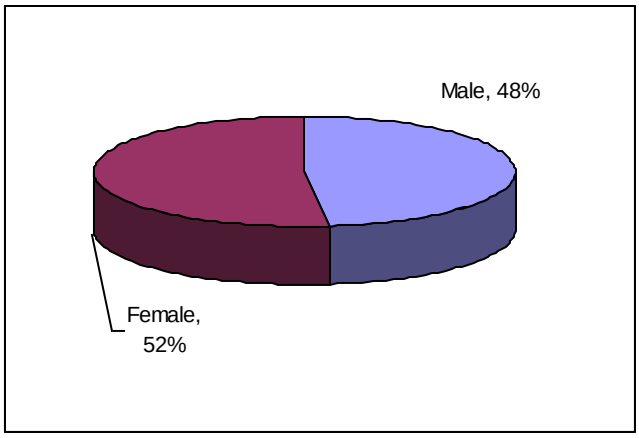

Table 2: Frequency of Hyperlipidemia in patients presenting with Ischemic stroke (n=178)

Hyperlipidemia	=n	%age
Yes	66	37.1
No	112	62.9

Table 3: Frequency of diabetes mellitus in patients presenting with ischemic stroke (n=178)

Diabetes	=n	%age
Yes	17	9.6
No	161	90.4

Table 4: Frequency of hypertension in patients presenting with ischemic stroke (n=178)

Hypertension	=n	%age
Yes	18	10.1
No	160	89.9

Table 5 **(**Descriptive Statistics)

Variable	Mean±S.D.
Age (in years)	55.96±15.76
Serum cholesterol (mg/dl)	201.14±44.87
Serum triglyceride (mg/dl)	159.20±27.10
Serum low density lipoprotein (mg/dl)	98.65±33.65
High density lipoprotein (mg/dl)	65.36±15.87

Table 6: Age distribution of ischemic stroke patients in relation to outcome

Age (years)	Ischemic stroke patients	Patients with Hyperlipidemia	%age
20-39	25	2	8.0
40-59	63	26	41.3
60-79	73	31	42.5
80 and above	17	7	41.2

Table 7: Gender distribution of ischemic stroke patients in relation to outcome

Sex	Ischemic stroke patients	Patients with Hyperlipidemia	%age
Male	86	29	33.7
Female	92	37	40.2

DISCUSSION

Stroke is a leading cause of functional impairment, with 20% of survivors requiring institutional care after 3 months and 15% to 30% being permanently disabled. Stroke is a life-changing event that affects not only the person who may be disabled, but the entire family and other caregivers as well. According to World Health Organization estimates, 5.5 million people died of stroke in 2002, and roughly 20% of these deaths occurred in South Asia. Moreover contrary to decline in the incidence of the disease in the Western population, the burden of the disease in South Asian countries (India, Pakistan, Bangladesh, and Sri Lanka) has increased and is expected to rise further.

Data on the known modifiable risk factors for stroke from developed world populations show an alarmingly high prevalence within the population of Pakistan. Hypertension – the single most preventable cause of stroke–affects one in three adults aged greater than 45 and 19% of the population aged 15 and above[15]. Hyperlipidemia has been reported 16% in normal and 68% in obese population.[16] The National Health Survey of Pakistan showed that diabetes mellitus is present in 35% > than 45 years of age. Coronary artery disease can cause cardio embolic stroke and is a substitute for atherosclerosis in the cerebrovascular system: a population based cross sectional survey showed a prevalence of 1 in 4 middle aged adults with men and women at equal risk.[17] The overall prevalence of obesity is 28% in women and 22% in men[18]. The prevalence of tobacco use is 40% in men and 12% in women[19].

This study was designed to find out frequency of hyperlipidemia in patients with ischemic stroke among other risk factors. Mean age at presentation of ischemic stroke was 55.96±15.76 years. There were 86(48%) male and 92(52%) females. Frequency of hyperlipidemia in our study was 37.1%. Whereas other risk factors were hypertension 10.1% and diabetes 9.6%. These results are comparable to the available literature.

Asghar Kamal and colleagues[20] investigated risk factors for stroke. Mean age of the patients was 63.42 years. The important risk factors were hypertension (60%), diabetes mellitus (20%), hyperlipidemia (18%), cigarette smoking (16%) and cardiovascular disease (16%).

Hamzullah Khan and Associates[21] evaluated risk factors of stroke and found hypertension 46.2%, diabetes 15.4%, ischemic heart disease 12.1%, smoking 5.5%, hyperlipidemia 3.3%.

Niaz Ahmed Shaikh et al[22] in a study carried out at Karachi revealed frequency of hyperlipidaemia in ischaemic stroke patients as 19.65%.

In a recent study Balci Kemal et al[23] evaluated risk factors for ischemic stroke in young patients (18 to 47 years). Hypertension was found to be the main risk factor (45%) followed by cigarette smoking (37%), hyperlipidemia (35.4%), diabetes mellitus (17%), and family history of stroke (18%). Hypertension, diabetes mellitus, hypercholesterolemia, and smoking were present either alone or in combination in the majority of patients.

Mendez and colleagues found in patients ages 60 to 69 that mean fasting LDL cholesterol levels changed from 136±20mg/dl on day 1 to 115±17 mg/dl on day 7 and 160±16mg/dl at 3 months following an acute ischemic stroke[24].

In the study carried out by Kalita J et al[25] there were 198 patients with ischemic stroke whose median age was 56 years and 36 were females. In the study group, 55.1% were hypertensive, 24.7% diabetic, 30.8% smoker and 28.8% obese. Serum cholesterol was elevated in 11.7% and LDL in 10.8% patients.

Putaala J et al[26] analyzed patients with first-ever ischemic stroke. There were 628 male and 380 female (ratio 1.7:1) patients, females were preponderant among those <30, whereas male dominance rapidly increased around age of 44. The

most frequent risk factors were dyslipidemia (60%), smoking (44%), and hypertension (39%). Males and patients > 44 clearly had more risk factors.

González Hernández et al[27] evaluated risk factors, etiology and prognosis in patients older than 80 years old with ischemic stroke or less than 80 years. In the group aged>80 years, 43.4% were men and 56.6% were women (64.1% men and 35.9% women in the group aged<80 years). Hypertension was present in 81.1% of patients aged >80 years (68.1% in those aged <80 years); previous DM was found in 29.2% (39.3% in the group aged <80 years); hyperlipidemia was present in 26.4% (40.2% in the group aged <80).

They concluded that ischemic stroke in patients over 80 years old leads to certain differences in relation to risk factors, stroke etiology and stroke severity.

Gorelick PB et al suggested that there is mounting epidemiologic evidence to support the relationship of lipids as a risk factor for ischemic stroke. They reviewed epidemiologic and pathophysiologic evidence for such a link.

Bodo M et al[28] identified prevalence of the following stroke risk factors: overweight 63.25%, smoking 30.55%, high blood cholesterol 28.70%, hypertension 27.83%, high triglyceride 24.35%, alcohol abuse 6.74% and diabetes 4.53%.

A controlled study showed that hypertriglyceridemia is commonly found in patients with ischemic cerebrovascular disease whatever the etiologic subtype, whereas hypercholesterolemia is related more to SVD and LVD. In addition to hypertension and diabetes, hypercholesterolemia may also be involved in the etiology of SVD and differs from LVD by a lower decrease in HDL-C[29].

Jordi Jimenez-Conde et al[30] have reported risk factors for ischemic as hypertension 62.3%, diabetes 19.2%, hyperlipidemia 38.7% smoking habit 54.3%.

Increased cholesterol is associated with an increased risk of ischemic stroke. Studies in men subsequently showed increases in ischemic stroke rates at higher levels of total cholesterol, particularly for levels above 240 to 270 mg/dl[31]. The Asia Pacific Cohort Studies Collaboration found a 25% increase in ischemic stroke rates for every 1 mmol/L increase in total cholesterol[32].

Dyslipidemia was present in 32% of patients with ischemic stroke[10] which is higher than 11–23% reported in other study from Pakistan[33].

The association between total cholesterol and risk of ischemic stroke has been investigated in several prior observational studies, of which some found increased risk with increasing cholesterol levels[34-37], and some no clear associations.[31,38-40]

In a prospective study of over 787,000 Korean civil servants, total cholesterol was strongly associated with increased risk of ischemic stroke. For a 1 mmol (38.7mg/dL) increase of total cholesterol, the relative risk of ischemic stroke was 1.41 (95% CI, 1.37-1.45) and total cholesterol levels of >4.14 mmol (>160.1mg/dL) were significantly associated with stroke risk[41].

In contrast, a large cohort study of over 14,000 middle aged men and women found no consistent association between LDL-C and ischemic stroke during 10 years of follow-up[42].

With regard to HDL-C, several studies found a significant association between HDL-C and ischemic stroke after adjustment for potential confounders[31,36,37].

Mouradian et al[43] found history of hyperlipidemia was present in 451 patients (32.6%) with stroke. Among 930 patients without history of hyperlipidemia, 739 (79.5%: 95% CI: 76.8-82.1) were diagnosed with hyperlipidemia.

For a disease like stroke which carries a high degree of mortality and morbidity, affliction at a young productive age is a tragedy for the person as well as the family. Efforts are required to identify the underlying risk factors with a view to plan strategy of prevention.

CONCLUSION

A high prevalence of hyperlipidemia (37.1%) is alarming in our setup and requires attention of the physician on modifiable risk factors.

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