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A Study of LDL Status of Stroke Patient Admitted in Tertiary Care Hospital

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Abstract

Background*: Stroke is the leading cause of morbidity globally and the second most frequent cause of mortality after ischemic heart disease. Previous findings regarding the relationship between lipids and stroke were debatable.*

Objective*: To observe LDL status of stroke patients in tertiary care hospital.*

Method: *This cross-sectional observational study was conducted in the Medicine Unit of Sir Salimullah Medical College Mitford Hospital, Dhaka from August 2011 to January 2012. A total of 104 patients of any sexes who were clinically present with features of stroke and then confirmed on CT scan were included. Patients were randomly enrolled according to the selection criteria. Data were collected using a structured questionnaire. Patients demographic profile, co-morbidities, history of TIA, and lipid profile were collected and recorded. Data were presented as frequency with percentage in case of categorical data and mean and standard deviation in case of numerical data. The Chi- Square test and unpaired t test was used to analyze categorical and numerical data respectively. A value of p <0.5 was considered statistically significant. Statistical software SPSS was used for data analysis.*

Result: *The average age was 62.12±11.65 years. The majority of patients (61.5%) were men, while 38.5% were women. Out of 104 patients, 57.7% had high blood pressure, 33.7% had diabetes, 22.1% had IHD, and 26.0% had had a stroke or TIA in the past. 21.2% of the patients used smokeless tobacco, and about 41.3% smoked cigarettes. 73.1 percent of the patients had ischaemic strokes, and the remaining 26.9 percent had hemorrhagic strokes. It was found that dyslipidaemia was more frequently linked to ischaemic stroke than hemorrhagic stroke. Nearly 78.8% of stroke victims had high LDL levels, 44.2% had low HDL levels, 57.7% had high cholesterol, and 57.7% had high triglyceride levels. Patients who had ischaemic strokes were found to have higher levels of LDL than patients who had hemorrhagic strokes, but the difference was not statistically significant.*

Conclusion*: Elevated LDL cholesterol was found higher in ischemic stroke patients than hemorrhagic stroke patients but there was no significant difference.*

Introduction

Clinically, stroke is described as a neurological deficit with a sudden onset, focal rather than generalized neurological dysfunction, symptoms that last longer than 24 hours or cause death before 24 hours, and symptoms that are presumed to have a non-traumatic origin after adequate investigation[1]. The two main types of stroke are hemorrhagic and ischemic. Cerebral infarction is the main factor in strokes.[2] Cerebral infarction accounted for about 80% of first-ever strokes, primary intracerebral haemorrhage (PICH) for 10%, subarachnoid haemorrhage (SAH) for 5%, and other types of haemorrhage for 5% of cases, according to

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community-based incidence studies like the Oxfordshire Community Stroke Project (OCSP).[3]

Age, male gender, ethnicity, diet (particularly foods high in fats, cholesterol, carbohydrates, and salt), stress, sedentary lifestyle, level of urbanisation, family history, blood cholesterol, diabetes mellitus, and pre-existing vascular diseases are all risk factors for stroke.

Total cholesterol (TC), a modifiable risk factor, has been linked in some studies to an increased risk of stroke.[4] From 1990 to 2013, the number of stroke-related disability-adjusted life years attributable to high TC (>185 mg/dL) increased by 24%.[5] While some studies have found an inverse relationship between TC and hemorrhagic stroke[6-9], most studies have found a positive association between TC and ischemic stroke.[6,7] Other studies either did not identify TC as being associated with various subtypes of stroke or only found weak relationships between the two.[10,11] Other lipids' associations with stroke, particularly type-specific stroke, were inconsistent for low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), and triglycerides.[8,12–14]

Stroke is the second-leading cause of death and the primary global cause of long-term disability.[15] As a result, it raises problems with health, society, and rehabilitation. Additionally, it makes a sizable global contribution to adult morbidity and mortality. It is anticipated that the burden of stroke will significantly increase in the future due to the ageing issue.[16] The World Health Organisation (WHO) estimates that 15 million people experience a stroke each year. 5 million of them pass away, and another 5 million become permanently disabled[17].

Since more than half of the world's population resides in Asia and since stroke is the most common vascular disease in many regions of Asia, the issue of stroke has a disproportionately large impact there[18]. According to a recent estimate by the WHO, 85% of stroke deaths worldwide occur in developing nations. Stroke mortality rates per 100,000 people are high in developing nations among those aged 30-69. The prevalence of stroke-related disability in these nations is nearly seven times higher than in developed nations. The prevalence of stroke-related disability in these nations is nearly seven times higher than in developed nations. Therefore, both developed and developing countries need to have a defined stroke burden globally. According to estimates, 4.5 million Americans are currently dealing with the aftereffects of a stroke, and 570,000 more people will survive a stroke that leaves them disabled each year[19]. According to WHO, by 2030, 80% of strokes will occur in low and middle income countries, and stroke will account for 7.9% of all mortality in low-income countries, ranking third only to ischemic heart disease and HIV/AIDS.[20] The global incidence of stroke has been estimated to be 2/1000 population per year; approximately 4/1000 in people aged 45-84 years. This type of neurological disorder accounts for at least 50% of all neurological disorders treated in general hospitals and accounts for 10% of all deaths worldwide.[21]

The dietary and lifestyle changes have contributed to dyslipidemia's rising prevalence in our society. It is widely acknowledged that reducing these risk factors will significantly lower the rates of morbidity and mortality to acceptable levels.[22] It has been found that subjects with hyperlipidemia who are aware of their increased risk for stroke adhere to stroke prevention recommendations more closely.[3]

In many developing nations that are going through an epidemiological shift from communicable to non-communicable chronic diseases, dyslipidemia has grown to be a serious issue.[1] Dyslipidemia and cerebrovascular diseases have become major public health concerns in these nations as a result of urbanisation, population ageing, and socioeconomic shifts that favour sedentary lifestyles, obesity, and alcohol consumption, among other things.

Methods

This cross-sectional observational study was conducted in the Medicine Unit of Sir Salimullah Medical College and Mitford Hospital, Dhaka from August 2011 to January 2012. A total of 104 patients of any sexes who were clinically present with features of stroke and then confirmed on CT scan were included. Patients who refused to participate in this study and whose CT scan of the brain was not done were excluded from this study. Data were collected using a structured questionnaire containing all the variables of interest. The questionnaire was finalized through pre-testing.

The protocol was approved by the local research approval committee prior to the start of the study. The study's goals and objectives were explained to respondents, and informed and verbal consent was obtained from each subject. They were assured

that all information and records would be kept private and used solely for research purposes.

The study included 104 patients of any gender who had clinical signs of stroke that were later confirmed by a CT scan. The criteria for the selection were followed, and patients were enrolled at random. A well-structured questionnaire was used to gather the data. The lipid profile, co-morbidities, TIA history, and demographic information of the patient were gathered and documented. In the case of categorical data, the data were presented as frequency with a percentage, and in the case of numerical data, as mean and standard deviation. Analysing categorical and numerical data, respectively, was done using the Chi-Square test and the unpaired t test. A value of $p < 0.5$ was considered statistically significant. Statistical software SPSS was used for data analysis.

Results

Table I. Demographic profile of the study subjects (N=104)

	Frequency (n)	Percentage (%)
Age		
≤40	3	2.9
41 – 50	17	16.3
51 – 60	35	33.7
61 – 70	33	31.7
71 – 80	12	11.5
>80	4	3.8
Gender		
Male	40	38.5
Female	64	61.5
Level of education		
Primary	39	37.5
Illiterate	35	33.7
Secondary	27	26.0
Graduate and above	3	2.9
Occupation		
Housewife	38	36.5
Business	34	32.7
Service	12	11.5
Farmer	11	10.6
Labourer	5	4.8
Other	4	3.8

The mean age was 62.12 ± 11.65 years. More patients were in the age group of 51-60 years (33.7%) followed by 61-70 year age group (31.7%). Most of the patients were male (61.5%) and the rest 38.5% were female. It is evident from the table that about one-third of the patients were illiterate and one-third were educated up to primary level. About one-fourth of the patients had secondary level education. It is shown in the table that business was the main profession among men (32.5%) followed by service (11.5%). Females were mainly housewives (36.5%) (Table 1).

Table II. *Distribution of patients by clinical features*

Clinical features	Frequency	Percent
Vertigo	23	22.1
Vomiting	23	22.1
Fever	21	20.2
Convulsion	12	11.5
Visual disturbance	8	7.7

TableII presents symptoms of the patients. Vertigo and vomiting were reported by same number of patients (22.1%) while about 20% patients complained of fever. Twelve patents had convulsion also (Table II).

Table III: Co-morbidities of the study subjects

	Frequency	Percent
Hypertension	60	57.7
Diabetes mellitus	35	33.7
Ischemic heart disease	23	22.1
Previous history of stroke/TIA	27	26.0

Out of 104 patients 57.7% had hypertension, 33.7% had DM, 22.1% had IHD and 26.0 had previous history of stroke/TIA (Table III).

Table IV. Distribution of the patients by personal habits

Personal habits	Frequency	Percent
Smoking	43	41.3
Betel nut use	50	48.1
Tobacco chewing	22	21.2
Alcohol consumption	1	1.0

About 41.3% of the patients were smokers and 21.2% used smokeless tobacco.

Table V: Distribution of patients by level of consciousness

Level of consciousness	Frequency (n)	Percentage (%)
Conscious	68	65.4
Confused	15	14.4
Stupor	17	16.3
Coma	4	3.8

Most of the patients were conscious (65.4%) while about 14.4% patients were confused. Only 4 patients were in coma (Table 5)

Table VI: *Distribution of the patients by types of stoke*

Level of consciousness	Frequency (n)	Percentage (%)
Infarction	76	73.1
Haemorrhage	28	26.9

Most of the patients experienced ischaemic stroke (73.1%) and remaining 26.9% patients suffered from haemorrhagic stroke (Tablel 6).

Table VII. Lipid profile of stroke patients by type stroke

Lipid profile	Total	Type of stroke		p-value
		Infarction (n=76)	Haemorrhage(n=28)	
High LDL (>100 mg/dl)	82 (78.8)	61 (74.4%)	21 (25.6%)	0.751
Low HDL (<35 mg/dl)	46 (44.2)	37 (80.4%)	9 (19.6%)	0.199
High Cholesterol (>200 mg/dl)	60 (57.7)	47 (78.3%)	13 (21.7%)	0.235
High Triglyceride (>150 mg/dl)	60 (57.7)	48 (80.0%)	12 (20.0%)	0.073

Dyslipidaemia found to be more associated with ischaemic stroke than haemorrhagic one. About 78.8% stroke patients had high LDL, 44.2% patients had low HDL, 57.7% patients had high cholesterol and 57.7% patients had high triglyceride level. It was found that patients with ischaemic stroke had high level of LDL in contrast to patients with haemorrhagic stroke but the difference was not statistically significant.

Discussion

This cross sectional study was undertaken to observe LDL status of stroke patients in Sir Salimullah Medical College and Mitford Hospital Dhaka. A total of 104 cases were included in the study

It's a known fact that stroke frequency rises with increasing age [23]. In the present study, majority of the study subjects (97.1%) were above the age of 40 years and the peak incidence was between 51 and 60 and 61 and 70 years (33.7% and 31.7% respectively). Bell et al [24] studied 50 patients with CVD. Most of the incidence of stroke was between the ages of 50 and 69 years. Similar studies in our country [25, 26] and abroad [27, 28] showed the same age incidence between 5th and 7th decades.

Men suffer more than women from stroke and it affects male 1.7 times more than female [29]. In this study, 62% were male and 38% were female with a male female ratio of 1.6:1 which coincide with finding of Kurtzke [30].

The present study (Table III) shows only 26% of the total patient had past history of stroke or TIA. An incidence study shows that 18% (Aho et al) [31] to 26% (Walker et al) [32] patients suffered from acute stroke had past history of one or more episode of stroke which is similar to this present study.

The present study shows (Table III), 57.7% of the stroke patients were suffering from hypertension. Hayee et al. [33] have found that among their studied patients, 52.1% were hypertensive. Alamgir and Mannan [34] also found in their study that 58% of stroke patients were hypertensive. A study among the NIDDM with stroke in BIRDEM by Latif et al. [35] found that 50.3% of the patients were hypertensive. Similar studies in Asian countries also correlate with the present study[36]. So all the above studies agree that hypertension is the most important risk factor for stroke, but a lack of effective control is a major concern throughout the world.

According to the current study, 33.7% of stroke patients had diabetes. This finding is quite high compared to research by Dhamiha et al.[37] from India, who discovered that diabetes affected 18.99% of stroke patients, and research from the Dutch community[38], which revealed close to our finding of 29% of stroke patients with diabetes. A study[23] on 165 diabetic patients in BIRDEM revealed that every single one of them experienced a stroke in less than 10 years. Kannel and Wolf [39] came to the conclusion that diabetes causes 10% (male) to 14% (female) of strokes in addition to increasing a patient's risk of having a stroke by 2.5 (male) to 3.7 (female) times.

In this study, heart disease was associated with 23 cases (22.1%). In our country, a comparable study by Hayee et al.[33] on 427 stroke patients discovered that 29.66% had various heart diseases. Stroke risk is most definitely increased by ischaemic heart disease[28]. In a British study involving 41 middle-aged men, it was discovered that men with definite evidence of a prior myocardial infarction had a fourfold higher risk of stroke than men without such a condition. According to Budlie [40], 24% of stroke patients had signs of previous myocardial infarction.

According to the current study, 41.3% of the patients smoked. Numerous studies have shown that cigarette smokers have a higher risk of stroke. Both Yano et al.[43] and Donan et al.[42] have demonstrated a significant correlation between smoking and stroke. The current study also reveals that 48.1% of study participants chewed betel nut regularly, which is significantly more than the study by Bashar 34 (21%). The fact that it is more well-liked in rural areas could be the cause. Among the patients, smokeless tobacco use was widespread (21.2%). The patients' main symptoms included anaemia, cardiac murmur, dysarthria, corneal arcus, and xanthoma. 73% of the patients in the study who underwent CT scans had ischaemic strokes, while 27% had hemorrhagic strokes. This finding contrasts with the majority of Western studies, where cerebral infarction predominates over cerebral haemorrhage. But Khan et al.[43]'s study revealed nearly identical findings. This study found a higher incidence of intracerebral haemorrhage, which could be explained by the fact that the clinical picture of cerebral infarction is less severe than intracerebral haemorrhage, which lowers the likelihood of hospitalisation for cerebral infarction patients.

Both ischaemic and hemorrhagic stroke risk factors continue to be associated with dyslipidaemia. In this study, it was discovered that high LDL levels, a sign of lipid abnormalities, were present in 74.4% and 25.6%, respectively, of cases of ischaemic and hemorrhagic stroke. Both ischaemic and hemorrhagic stroke (present in 80.4% and 19.6%, respectively) have low HDL levels. 57.7% of the patients in the current study have elevated serum total cholesterol levels. Infarction is found to be more frequently associated with high cholesterol levels than haemorrhage (78.3% versus 21.7%). High triglyceride levels are present in about 58% of stroke patients. These results are in line with the study of Hayee et al.[33]. A recent study by Wanamethee et al. [44] found that while elevated serum total cholesterol levels showed a weakly positive association with non-fatal stroke, higher levels of HDL cholesterol were significantly associated with a decreased risk of non-fatal stroke. Hypercholesterolemia has been demonstrated in a prior study to be a risk factor for stroke before the age of 60[45].

Conclusion

It has been shown that elevated LDL cholesterol is a significant risk factor for developing CVD. Because LDL cholesterol level is independent of the metabolic syndrome for the development of CVD, lowering a patient's LDL cholesterol level should be considered together with treatment of other metabolic disorders for the prevention of CVD.

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