Clinical Profile of Acute Ischemic Stroke and Correlation with CT scan and USG Carotid Artery Doppler findings

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Abstract

Background: A stroke, or cerebrovascular accident, is defined as an abrupt onset of a neurologic deficit that is attributable to a focal vascular cause. Thus, the definition of stroke is clinical, and laboratory studies including brain imaging are used to support the diagnosis. People with carotid artery narrowing are at an increased risk of having a stroke or experiencing another stroke after already having one or a transient ischemic attack (TIA). Carotid artery stenosis can be assessed using noninvasive high-resolution B-mode ultrasonography of the carotid arteries. Carotid ultrasonography combines B- mode ultrasound image with a Doppler ultrasound assessment of blood flow velocity.

Methodology: A single-center prospective hospital-based observational study was conducted in Guwahati Medical College in the Department of Medicine, Neurology, and Geriatrics for a period of 1 year with a sample size of 150 patients. Data was collected by semi-structured questionnaire, clinical examination, and investigations. All the statistical graphs were prepared using Microsoft Excel 2007 and Microsoft Word 2007. Statistical analysis was performed using GraphPad InStat version 3.00 for Windows 7.Graphical software, San Diego California USA (www.graphpad.com). P value < 0.05 was taken as statistically significant.

Results: The results of 150 patients were assessed. The mean age was 54.21 years (SD±12.82) with a sex ratio of 1.2:1. Motor weakness was the most common clinical feature in 72%(n=108) , cranial nerve involvement29.3%(n=44), Speech and language were affected in (n=32) 21.3 % , altered sensorium(n=28 ,18.6 %), ataxia(n=24 ,16 %) and sensory involvement(n=15 ,10 %). Other features like hemianopia and agraphia and acalculia were also present in 3.3 % . Hypertension was the most common risk factor present in 58 %(n=87) followed by diabetes mellitus in (n=58 ,38.6 %)and with diabetes and hypertension in (n=40 ,26.26%). Smoking was present in 32%(n=48) and 44.28%(n=31) of them had stenosis in them. History of transient ischemic attack was present in (n=22 ,14.6 %) . In (n=70 ,46.6%) patients, there is a prevalence of carotid artery stenosis with (22%, n=33) of nonsignificant stenosis(14.6%, n=22)of significant stenosis(50-70% stenosis) ,(70-90% stenosis)significant stenosis category with (8.7% ,n=13) and total occlusion patients of about (1.3% ,n=2) among 150 patients . The most common site of lesion in patients with significant stenosis was MCA(n=31, 83.78%) followed by anterior cerebral artery territory(n=6, 16.21%). Studies showed that the predominance of carotid artery stenosis increased with age.

Conclusion: The incidence of stroke prevalence increases with age, male sex, diabetes and hypertension, and rheumatic heart disease. The most common clinical feature was unilateral motor weakness of limbs and the most common site of lesion was MCA territory. CT scan brain is useful in detecting the infarct in most of cases. CT scan of the brain may be normal if the CT scan is done within the early time of onset of stroke, in lacunar infarct and in posterior fossa lesions. These cases should be evaluated by MRI brain to detect the lesion. Carotid artery stenosis was present in 46.6 % of acute ischemic stroke patients. There is a significant association between the increase in age, male sex, diabetes mellitus, hypertension and smoking with carotid artery stenosis.

Introduction

A Stroke or Cerebrovascular accident is defined as an abrupt onset of a neurologic deficit that is attributable to a focal vascular cause. Thus, the definition of Stroke is clinical, and laboratory studies, including brain imaging, are used to support the diagnosis. Stroke remains the second leading cause of death worldwide, after Ischaemic Heart Disease. 85% of stroke cases are due to infarction, and 15% are due to hemorrhage [1]. The annual incidence of stroke is 0.2 to 2.5/per 1000 population. Worldwide, approximately 20 million suffer from stroke each year, and the global burden of stroke is 9.4 million deaths/year [2] . Though MRI is superior to a CT scan, the higher cost of the MRI and the easy availability of a CT scan brain make CT the most everyday investigation in the diagnosis and treatment of stroke [3] [1][2][3].

Early diagnosis and treatment are necessary to prevent mortality and morbidity. Stroke mimics are to be differentiated from stroke to avoid inappropriate treatment. Though there are many investigations, CT and MRI play a significant role in the diagnosis of Stroke. Though MRI is superior to a CT scan, the higher cost of the MRI and the easy availability of a CT scan brain make CT the commonest investigation in the diagnosis and treatment of stroke [3].

Carotid atherosclerosis typically occurs in individuals with risk factors such as diabetes, high blood pressure, smoking, and high cholesterol levels. The internal carotid artery is most commonly affected by atherosclerosis, after the abdominal aorta, followed by the common carotid artery. Atherosclerosis tends to develop more often in the extracranial section of the internal carotid artery than in its intracranial part. Over time, this condition leads to the formation of plaques in the arteries, which grow larger and cause narrowing (stenosis). As these plaques develop, they can damage the inner lining of the blood vessel, leading to ulceration. Once the vessel's lining is disrupted, platelets stick to the damaged area and form a clot, which triggers a chain reaction in the blood that results in the formation of a larger clot, potentially blocking blood flow completely. [4].

Thrombus formation on an atherosclerotic plaque leads to distal embolization and causes occlusion of blood vessels (or) severe stenosis, which may cause hypoperfusion and infarction of the brain tissue. Patients with carotid artery stenosis are at higher risk of developing stroke and recurrence of Stroke after a Stroke/Transient ischemic attack [4] . Carotid artery stenosis can be assessed by means of noninvasive high-resolution B-mode ultrasonography of the carotid arteries. Carotid ultrasonography combines a B-mode ultrasound image with a Doppler ultrasound assessment of blood flow velocity. These plaques alter the blood flow hemodynamics and increase the systolic flow velocity [5]. With this increased systolic flow velocity, stenosis can be detected. Severity can be assessed, and this can be helpful in our management protocol for ischemic stroke patients with carotid artery stenosis as a cause [4][5].

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Owing to the paucity of data on acute ischemic stroke in the Northeast, the present study aims to study the clinical profile of acute ischemic stroke patients in the North- East and its relation with CT scan brain and bilateral carotid artery Doppler findings.

Materials & Methods
Methods
This study was conducted at Gauhati Medical College and Hospital (GMCH), Guwahati, from 1st June 2019 to 31st May 2020 in the Department of Medicine and Department of Neurology from OPD, Wards, and ICU. This study was a hospital-based observation study that consisted of data from 150 patients. After obtaining approval from the Institutional Ethics Committee of GMCH, written informed consent was taken from the patients. Data was collected through a semi-structured questionnaire, clinical examination, and investigations.

Inclusion and Exclusion criteria
This includes ages more than 18 years among patients admitted to Gauhati Medical College and Hospital with neurological deficits due to suspected cerebrovascular accident with less than one week duration of onset of symptoms and given informed written consent during the period of 1st June 2019 to 31st May 2020. This study excluded patients with a duration of stroke > 1 week, patients with hemorrhagic stroke, head injury, and hemodynamically unstable Patients, systemic illnesses like malignancy, infections, unconscious patients, patients with stroke-like syndromes, and metabolic encephalopathies.

Data Collection Procedure
Data of all the patients satisfying the inclusion and exclusion criteria was collected. A questionnaire regarding basic demographic data, clinical history, and examination was collected. Patients was diagnosed with type 2 diabetes mellitus based on the ADA criteria. In this study, the following group of subjects was considered Hypertensives-patients already diagnosed and on treatment. Patients newly detected as hypertensives per Joint National Committee (JNC) 8 Guidelines. After a complete history recording, all the patients underwent a thorough and detailed general and neurological examination using a preformed proforma. All other systems examinations were done on all the patients. Neurological examination was done regarding motor, sensory, autonomic, and higher functional disturbances.

Statistical Analysis
All the statistical graphs were prepared using Microsoft Excel 2007 and Microsoft Word 2007. Statistical analysis was performed using GraphPad InStat version 3.00 for Windows 7. P value < 0.05 was taken as statistically significant.

Results

In this study, the youngest age encountered in the study was 36 years, and the oldest was 88 years. The mean age was 54.21 years (SD ± 12.82), and the maximum number of cases were above 60 years (96 cases - 64 %), followed by 40 to 60 years (48 cases - 32 %) and < 40 years (6 cases - 4 %).

Age group	Number of cases	Percentage
< 40 years	6	4 %
40- 60 years	48	32 %
> 60 years	96	64 %

Figure 1: age distribution of cases

The data represented with respect to total N=150

The total number of male patients was 82 (54.6 %) and female patients were 68 (45.4 %), and the male-to-female ratio was 1.2 :1.

Table 1.2: Sex distribution of cases.

Sex	Number of cases	Percentage
Male	82	54.6 %
Female	68	45.4 %

Figure 2: Sex Distribution of cases

The data has been represented with respect to N=150

In this study, the most common clinical feature was Motor weakness, which was present in 108 cases (72%), followed by Cranial nerve involvement in 44 cases (29.3%). Speech and language were affected in 32 cases (21.3 %), Altered sensorium in 28 cases (18.6 %), Ataxia in 24 cases (16 %) and Sensory involvement in 15 cases (10 %). Gaze palsy, seizure, and Nasal regurgitation were present in 14 cases (9.3 %), 12 cases (0.08 %), and 10 cases (6.6 %), respectively. Hemianopia was present in 7 cases, and agraphia and acalculia were present in 5 cases (3.3 %).
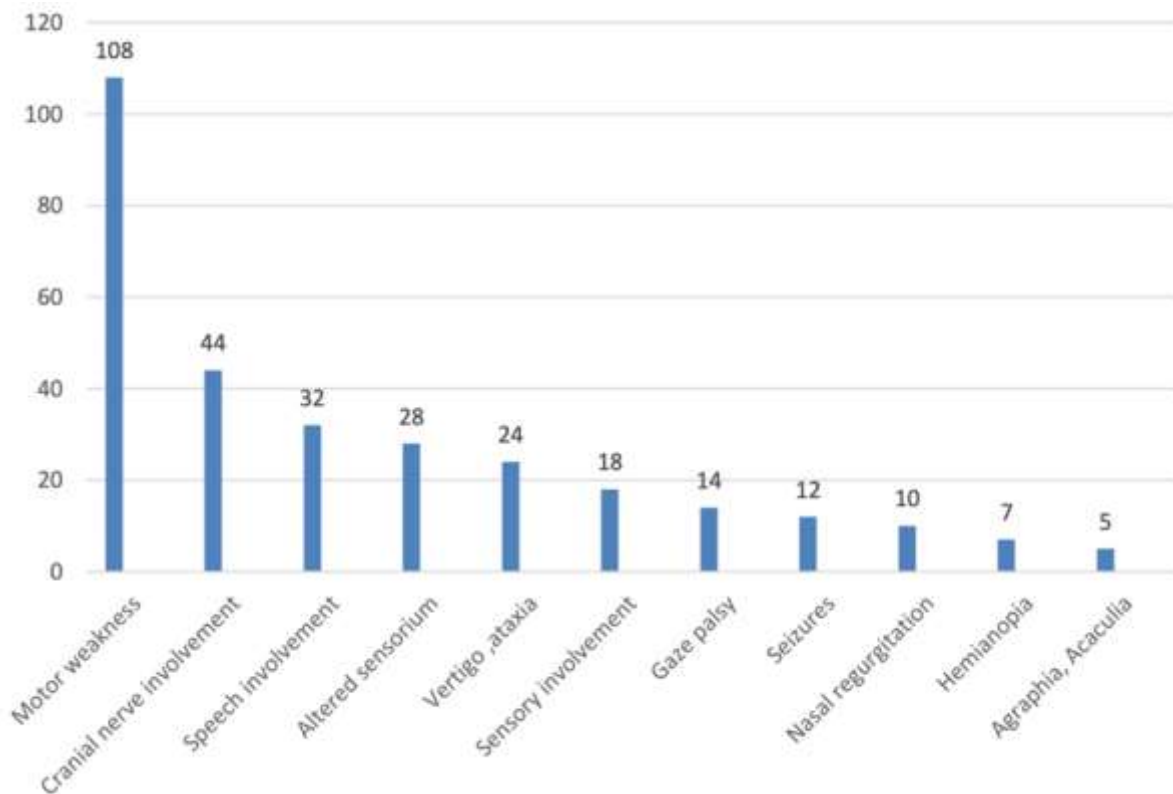
Figure 3: Frequency of Clinical Features in Stroke

The data has been represented as n,Y- represents n

Out of 108 cases presented with Motor weakness, 62 cases (57.4 %) presented with hemiparesis, 42 (38.8 %) cases with hemiplegia, and 4 cases (3.7 %) presented with monoparesis.
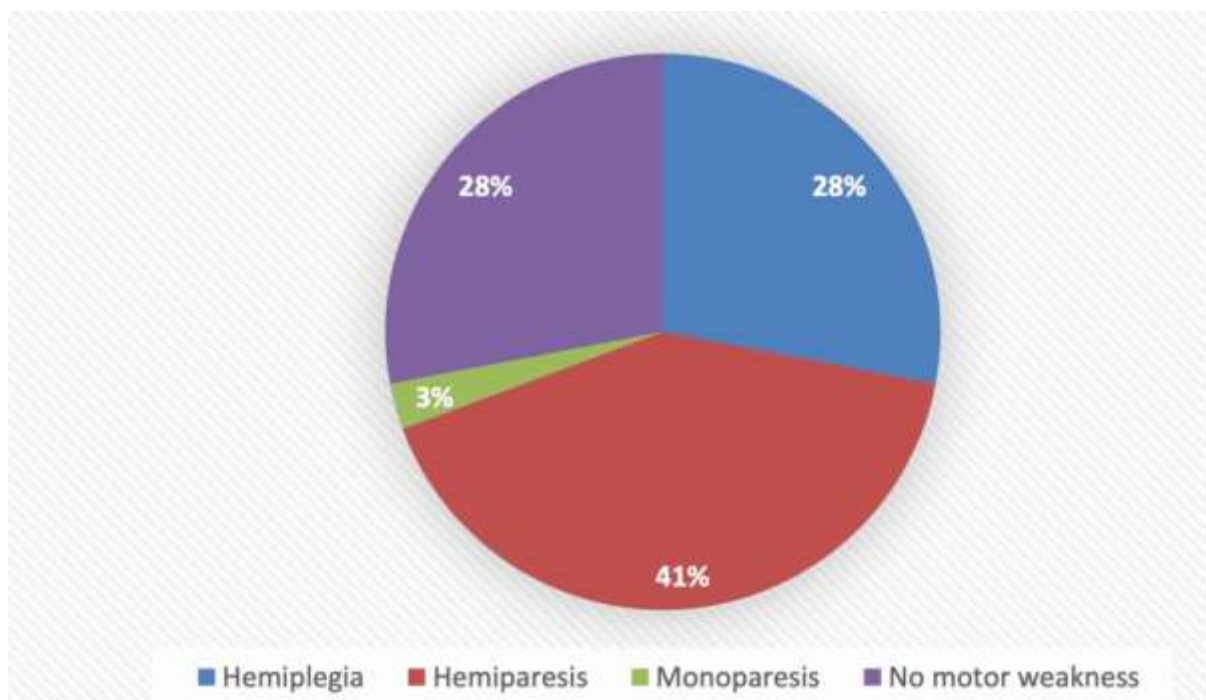

Figure 4: Pie Chart representation of Motor Weakness

The data has been represented as %

Hemiplegia n=42, Hemiparesis n=62,Monoparesis n=4, No motor weakness n=42

Right-sided weakness (57 cases - 38 %) was more than left-sided weakness (51 cases - 34%). The commonest modifiable risk factor in this study was Hypertension, which was present in 87 cases (58 %), followed by Diabetes mellitus (58 cases - 38.6 %), and 40 cases (26.26 %) had both Diabetes and Hypertension. Smoking was present in 48 cases(32%), and evidence of Rheumatic Heart Disease in 12 cases (8 %). History of Transient Ischemic Attack was present in 22 patients (14.6 %).
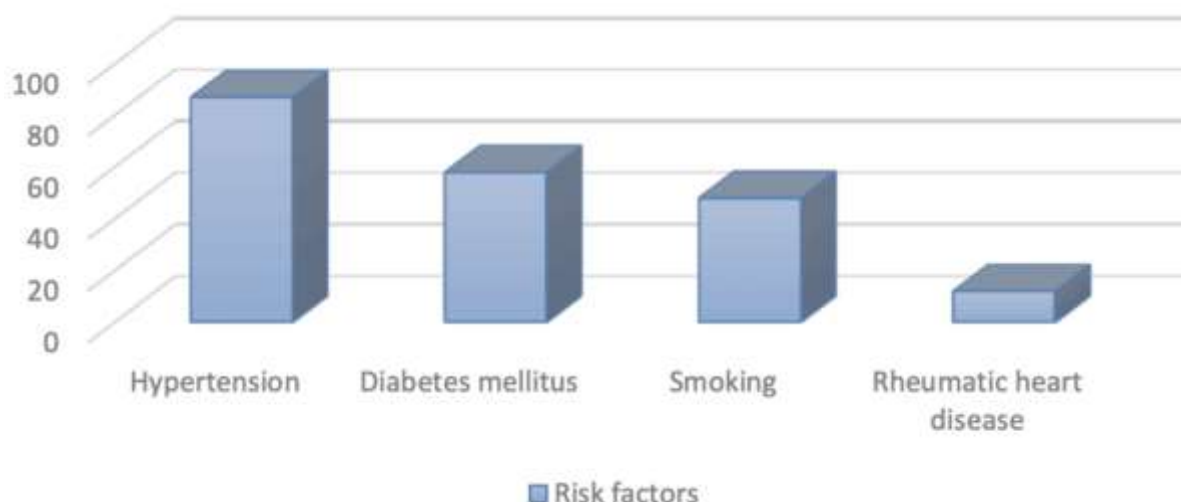

Figure 5: Risk factor analysis In Ischemic Stroke

The data has been represented as n ,Y axis- n

Hypertension -87 cases , Diabetes Mellitus-58 cases, Smoking-48 cases,RHD-12 cases

The most common etiology of stroke according to TOAST classification was extensive artery atherosclerosis 80 cases (53.3 %)

Etiology	Number of cases
Large artery atherosclerosis	80 (53.3 %)
Small vessel occlusion	12 (8 %)
Cardioembolism	12 (8 %)
Stroke of undetermined etiology	34 (22.6 %)
Unknown etiology	16 (10.6%)

Figure 6: Etiological profile of ischemic stroke according to TOAST classification.
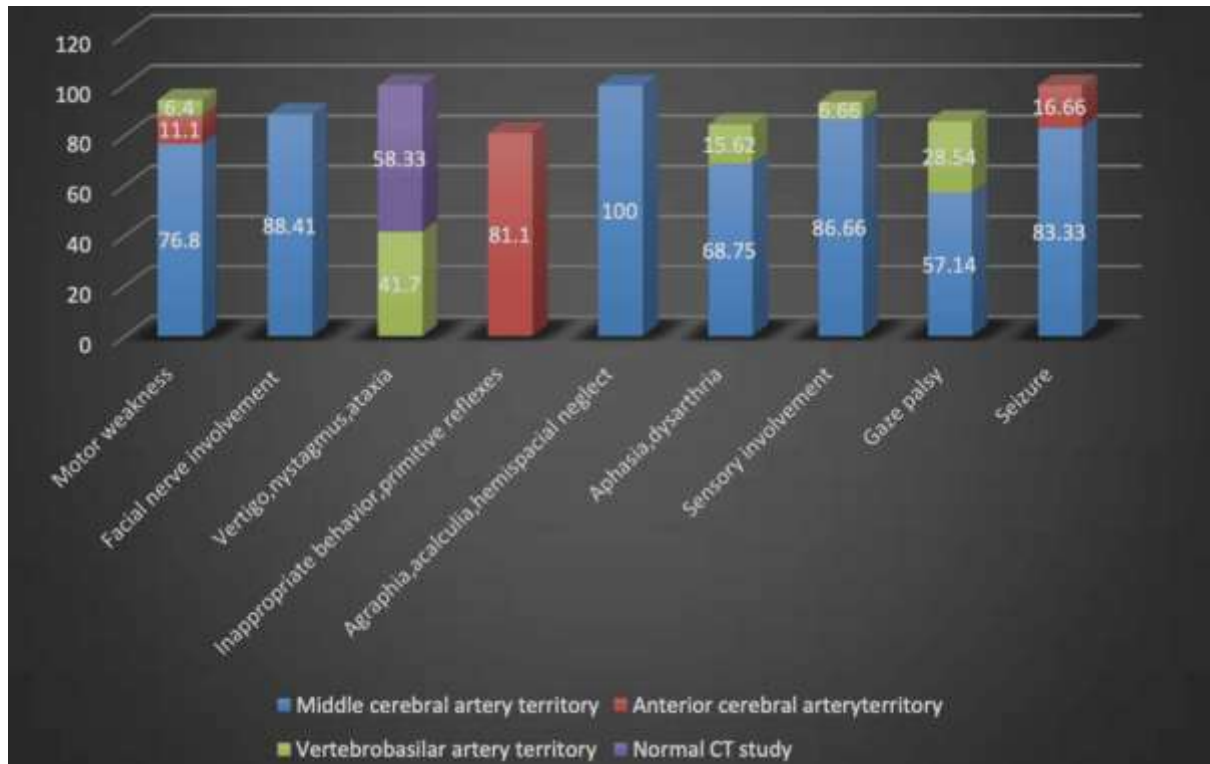
The data has been represented as n and %

Figure 7: Bar diagram showing clinical features and site of lesion in CT scan brain study.

The data has been represented as % which is depicted in Y axis

Out of 150 patients, 108 patients presented with Motor weakness. Most of these patients (83 cases - 76.8 %) revealed infarct in the Middle cerebral artery territory, followed by 12 cases (11.1 %) in the anterior cerebral artery territory and 7 cases (6.4 %) in the vertebrobasilar artery territory. CT scan was normal in 6 cases (5.5 %).

Middle cerebral artery territory	Anterior cerebral artery territory	Vertebrobasilar artery territory	Normal CT scan
83 (76.8 %)	12 (11.1 %)	7 (6.4 %)	6 (5.5 %)

Figure 8: Site of lesion in patients with motor weakness

The data has been represented as n and %

A total of 33 patients presented with Facial nerve involvement, like paralysis of one side of the face, loss of nasolabial fold, and slurred speech. Most patients (28 cases - 84.84 %) showed lesions in the Middle cerebral artery territory followed by Vertebrobasilar artery territory. CT scan was normal in 3 cases (9 %).
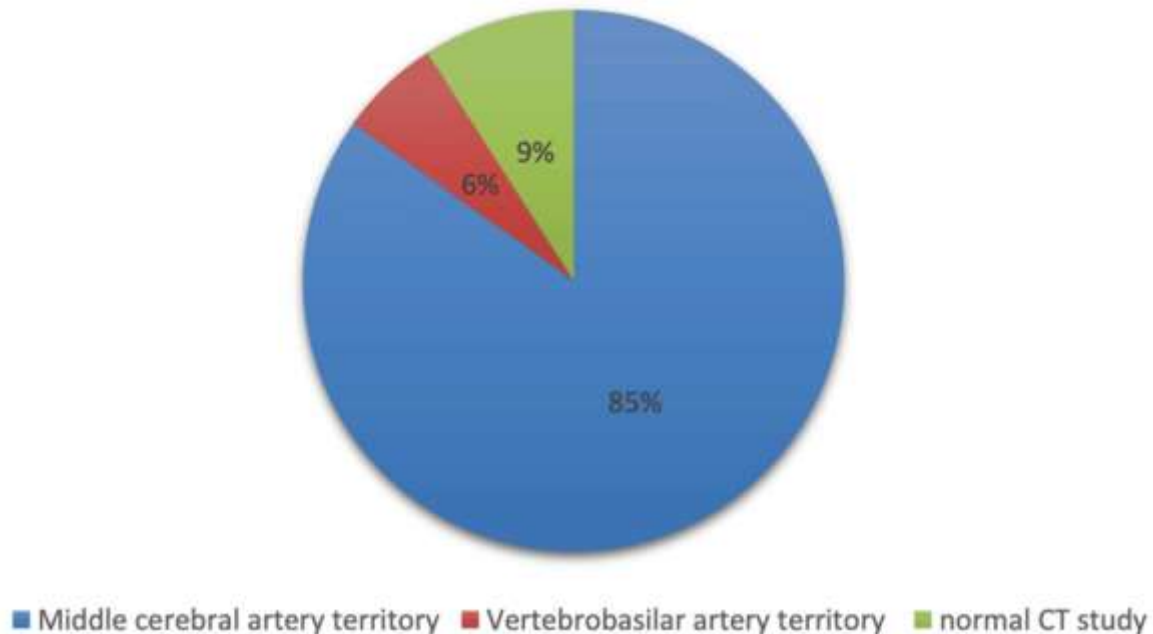
Figure 9: Pie diagram showing the site of lesion in patients with facial nerve involvement

The data has been represented as %

MCA n=28, Normal CT n=3, Vertebrobasilar artery n=2

A total of 24 patients were presented clinically with signs of posterior circulation stroke like vertigo, nystagmus, nasal regurgitation; dysarthria, and ataxia. Most of the patients revealed normal CT scan study (14 cases - 67 %), and 10 cases (41.7 %) showed infarction in the Vertebrobasilar artery territory. From these observations, it is evident that the middle cerebral artery territory is most commonly involved in cerebrovascular accidents (110 cases - 73.3 %).
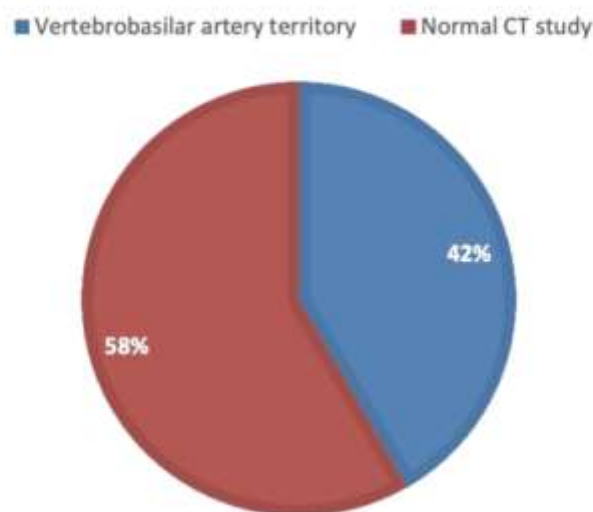

Figure 10: Pie chart showing the site of lesion in patients with signs of posterior circulation stroke.

The data has been represented as %

Out of 150 patients, 109 revealed Infarcts without midline shift (72.6%), 6 showed massive infarcts with

midline shift, and 12 had lacunar infarcts. CT scan was normal in 23 patients (15%).
Out of 150 patients, 70 revealed carotid artery stenosis in the carotid artery Doppler study (46.66 %).

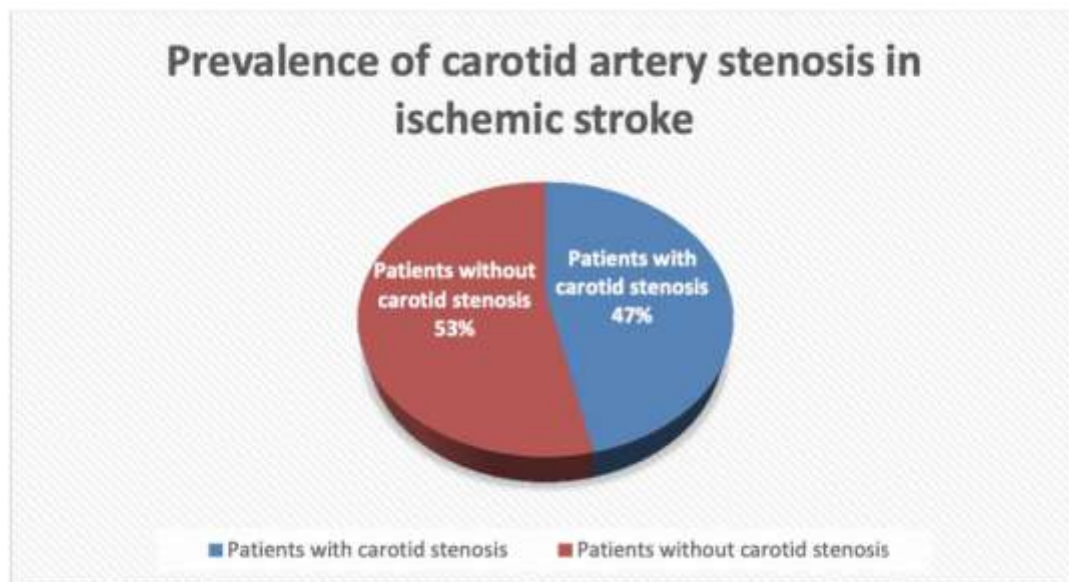| Total number of patients	Number of cases with carotid stenosis	Number of cases without carotid stenosis	Percentage of carotid stenosis
150	70	80	46.6 %

Figure 11: Prevalence of carotid artery stenosis in ischemic stroke patients

The data has been represented as %
Carotid artery stenosis, n=70, Without Carotid artery stenosis,n=80
A total of 33 cases (22 %) presented with Non-significant stenosis. The percentage of patients with Significant stenosis- 50 -70 % stenosis and 70 – 99 % stenosis were 14.6 % (22 cases) and 8.7% (13 cases), respectively, and total occlusion was present in 2 patients (1.3 %).A total of 37 cases (24.6 %) presented with significant stenosis (>50% stenosis). The most common site of lesion in patients with significant carotid artery stenosis was the middle cerebral artery territory (31 cases – 83.78 %), followed by the anterior cerebral artery territory (6 cases – 16.21 %).
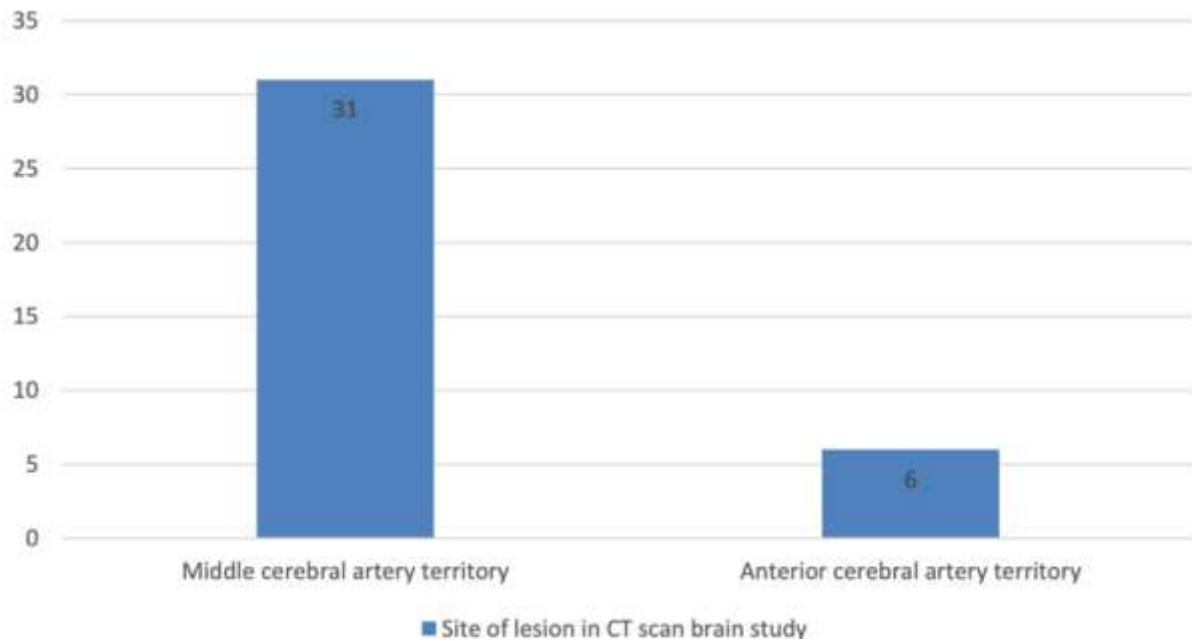
Figure 12: Site of lesion in patients with Carotid artery Stenosis

The data has been represented as n in Y axis

It was found that carotid artery stenosis increases with age, and there is a statistically significant association between age and carotid artery stenosis (P < 0.05). The total number of male patients was 43 (61.42 %), which was more than female patients 27 (38.57 %). The male-to-female ratio was 1.59:1. It was found that the occurrence of carotid artery stenosis was higher in patients with diabetes mellitus than in patients who are nondiabetic and it was statistically significant (P<0.05). Diabetes mellitus was present in 45.27 % of patients with carotid artery stenosis.
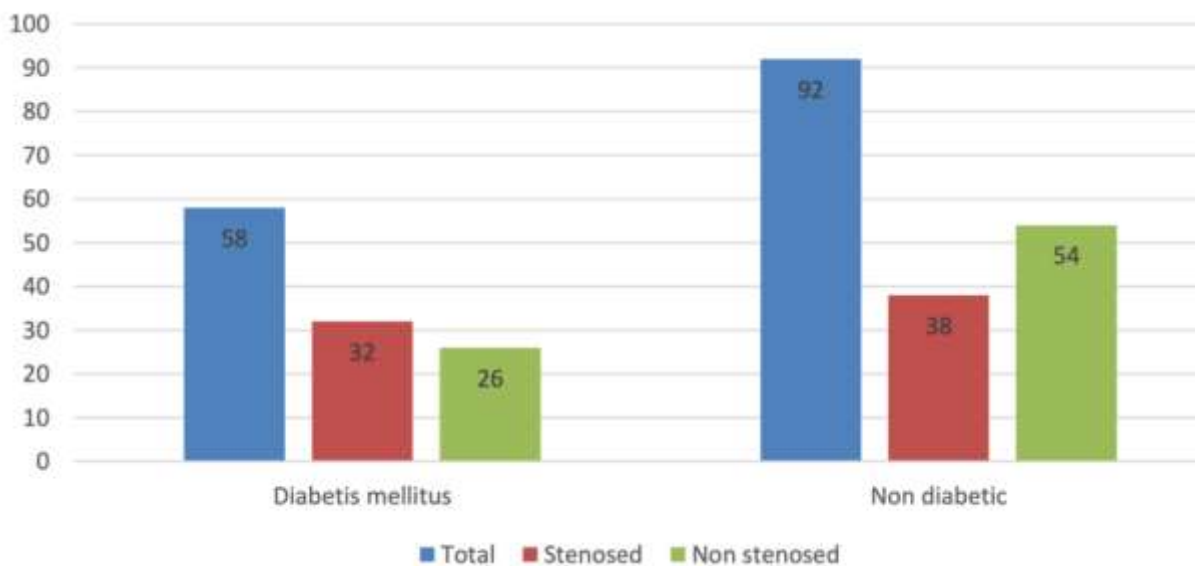

Figure 13: Diabetes Mellitus and Carotid Artery Stenosis

The data has been represented as n in Y axis

It was found that the occurrence of carotid artery stenosis was more in patients who are hypertensive than patients who are Non-Hypertensive and it was statistically significant ($P < 0.05$). Hypertension was present in 81.42 % of patients with carotid artery stenosis.
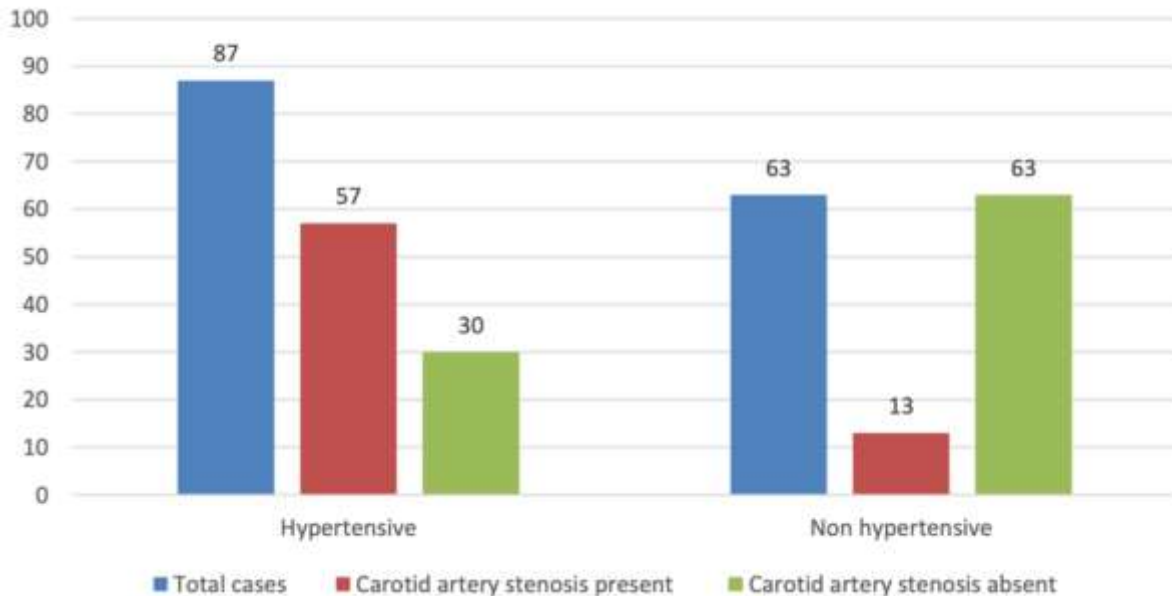

Figure 14: Hypertension and Carotid artery Stenosis

The data has been represented as n in Y axis

The occurrence of carotid artery stenosis was more common in smokers than in non-smokers and was statistically significant ($P < 0.05$).

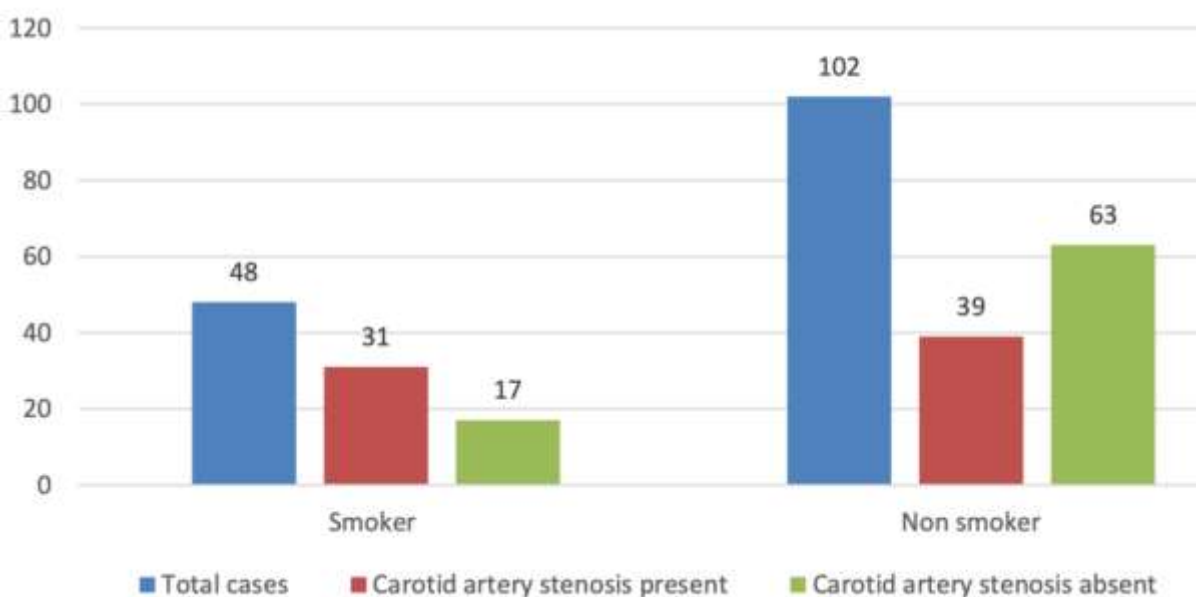44.28 % of patients with carotid artery stenosis were smokers.

Figure 15: Smoking and Carotid Artery Stenosis

The data has been represented as n in Y axis

Discussion

In this hospital-based observational study, patients with a neurological deficit due to a suspected cerebrovascular accident with less than one week duration of onset of symptoms attending Gauhati Medical College, Departments of General Medicine and Neurology were evaluated clinically and with CT scan brain study, Bilateral Carotid artery doppler and required laboratory investigations. The findings are as follows. Out of 150 patients in this study, the maximum number of patients were from the age group > 60 years (96 cases - 64%), followed by the age group 40 - 60 years (48 cases - 32 %) with a mean age of 54.21 years (SD ± 12.82). The youngest age encountered was 36 years, and the oldest was 88 years old. As in a study by [6] Vaidya C.V. et al., it showed an increase in the incidence of stroke with age. The maximum prevalence of ischemic stroke was in the age group above 60 years (54 %), with a mean age of 61 years [6]. The study by [7] Chitrambalam P et al. in 150 stroke patients and the study by [8] Naik M et al. showed an increase in the incidence of stroke with age, and the mean age was 58 years and 54 years, respectively [7][8]. The studies by [9] R.P. Eapen et al. and [10] Aiyar et al. showed an increase in the incidence of stroke with age, with a mean age of 55 and 55.39 years, respectively. The findings of these studies are comparable to those of our study. The increase in the incidence of stroke with an increase in age may be also due to the increased prevalence of risk factors like diabetes and hypertension in the elderly population [9][10]. The total number of male patients was 82 (55 %) and female patients were 68 (45 %). The male-to-female ratio was 1.2 :1. Male predominance of ischemic stroke is found in all Indian and international studies. In the study "A retrospective study of clinical profile of stroke patients" by [6] Vaidya C.V et al. the male-to-female ratio was found to be 1.4 :1. In the study conducted by [11], Ramachandran A. et al. in a tertiary care center in Bangalore, the male to female ratio was found to be 1.7 :1 [6][11]. A prospective multicentric observational study by [12] Kay Sin Tan et al. showed a male-to-female ratio of 1.9:1. The male predominance in this study is higher compared to our study. The increase in male predominance may be due to genetic and cultural differences [12]. The increase in the incidence of stroke in males may be due to the increased prevalence of smoking or other risk factors like diabetes and hypertension among males.

It was found that hypertension was the most common risk factor for ischemic stroke, and hypertension was present in 87 cases (58%)-a multicentric study by [13] Staessen. A J et al. and the study by [14] Banerjee T.K et al., which was conducted in Calcutta on the urban population, showed that hypertension is the most common risk factor for ischemic stroke with a prevalence of 70 % and 65 %, respectively [13][14]. The study by [6] Vaidya, C.V., et al. which was conducted in an urban population in Gandhinagar; Gujarat, and the study by [9]R P Eapen et al. in the Indian population also showed the prevalence of hypertension as 34 % and 32 % respectively that are lower than our study [6][9].

Diabetes mellitus was present in 39 % (58 cases) of cases, which is comparable with the studies by [15] Mallikarjuna, K.V., et al. conducted in a tertiary care center, Hyderabad, India, and [11] Ramachandran, A., et al. where the prevalence of diabetes mellitus was 31.8 % and 34 % respectively [11][15]. 32 % of cases (48 cases) were smokers, which is comparable with the study by [16] Kaul, S. et al. in the Indian population, where the prevalence of smoking was found to be 28 % [16]. The studies by [6] Vaidya, C.V et al. and [17] Patne, V.S., et al. showed a prevalence of smoking of 14.5 % and 19.52 %, respectively, which is less than our study and may be due to differences in demographical factors like variations of male-female ratio in the study population [6][17]. The total

number of patients with evidence of rheumatic heart disease was 12 (8 %) which is comparable with the study "Features of Acute Ischemic Stroke With Rheumatic Heart Disease" by [18] Wang D et al. where the prevalence of rheumatic heart disease was 7.9 % [18]. History of transient ischemic attack was present in 22 patients (14.6 %), and it is comparable with the studies of [19] Ukoha O.B. et al. and [20]Sallam A. A et al., where the prevalence of transient ischemic attack was 16.2 % and 12.2 %, respectively [19][20]. The most common clinical feature was unilateral motor weakness of limbs (108 cases -72 %). Right-sided weakness (52.7 %) was more than left-sided weakness (47.2%). This is comparable with the study of [7] Chitrambalam, P. et al., where the prevalence of motor weakness was 76 % [7]. Speech was involved in 32 cases (21.3 %), which is comparable with studies by [6] Vaidya, C.V. et al. and [11] Ramachandran A. et al., where the prevalence of speech involvement is 25.1 % and 24 %, respectively. The facial nerve was involved in 33 cases (22 %), which is comparable with the study of [11] Ramachandran, A. et al., where the prevalence of facial nerve involvement was 40 % [6][11]. Altered sensorium was present in 28 cases (18.6 %), comparable with the study of [6] Vaidya, C.V. et al., where altered sensorium was present in 13.1 % of cases. In the study conducted by [11] Ramachandran A. et al., altered sensorium was present in 4 % of cases, which is less than our study. Vertigo was present in 10 patients (6.6 %) and seizures in 7 cases (4.6 %), which is comparable with the study of [11]Ramachandran A et al., where the prevalence of vertigo and seizures are 5 % and 3 %, respectively [6][11]. Out of 150 patients diagnosed clinically with stroke, 127 patients revealed infarct in the CT scan brain study (84.6 %), and CT scan brain was normal in 23 cases (15.4 %). This is comparable with the study of [21] Ogbole, I.G. et al., (2015), where the percentage of regular CT scans was 21.7%. These cases that did not show infarct in CT scan are suspected to have small lacunar infarcts, which might have failed to pick up, or a CT scan may be done at the early time of onset of stroke. These cases require evaluation with an MRI brain for diagnosis [21]. Out of 23 cases that did not show any lesion in the CT scan study, 14 cases belonged to posterior circulation stroke clinically (60.8 % of normal CT). This may be due to bony artifacts and lack of sensitivity of CT in detecting posterior fossa region infarct. A total of 109 cases presented with infarct without midline shift (72.6 %), 12 cases (8 %) presented with lacunar infarct, and 6 (4 %) patients presented with massive infarct with midline shift. The most common etiology of ischemic stroke according to TOAST classification was large vessel stroke -53.3 %. This is comparable with the study of [22] Harris, S. et al. (2018), where large vessel atherosclerosis was present in 59.6 % of cases [22]. There were 108 cases presented with motor weakness. Out of this, 83 cases showed lesions in the middle cerebral artery territory (82.6 %) and 12 cases (11.1 %) in the Anterior cerebral artery territory. This is comparable with the study by [23] Rascol A et al. (2015), where the middle cerebral artery was involved in 72.4 % of cases. The middle cerebral artery is involved in motor weakness as it supplies the motor areas of the brain. A total of 33 patients presented with facial nerve involvement. Of these, 28 cases (84.84 %) showed lesions in the middle cerebral artery territory, and 2 cases (6 %) in vertebrobasilar artery territory [23].

A total of 24 patients presented clinically with signs of posterior circulation stroke like vertigo, nystagmus, nasal regurgitation; dysarthria, and ataxia. Most of the patients showed normal CT scan study (14 cases - 58.3 %) followed by an infarct in vertebrobasilar artery territory (10 cases - 41.7 %). Due to bony artifacts and lack of sensitivity of CT scan in detecting posterior fossa region infarcts, CT scan may be normal in posterior circulation stroke. These cases need to be evaluated by MRI brain and other newer diagnostic techniques.7 patients presented hemisensory loss, spatial neglect, hemiagnosia, agraphia, acalculia, constructional apraxia, and visuospatial disorientation; these symptoms are suggestive of parietal lobe involvement and the CT scan showed a lesion in the middle cerebral artery territory (parietal lobe - 100%

of cases). Eleven patients presented with Inappropriate behavior, the presence of primitive reflexes, and bladder impairment; these features are suggestive of frontal lobe dysfunction, and 9 cases showed lesions in the anterior cerebral artery territory (81.12 %).

The middle cerebral artery territory is the most common site of lesion in this study (110 cases -73.3 %). It is comparable with the study by [24] Khuraijam .T. et al., where the middle cerebral artery territory was involved in 68 % of cases, and the study by [25] Chung, J.W. et al. on "vascular territory of ischemic stroke lesions diagnosed by diffusion-weighted imaging " where the middle cerebral artery territory was involved in 65 % of cases [24][25]. Carotid artery stenosis was present in 46.6 % (70 cases) of patients with acute ischemic stroke. This is comparable with the study by [26] Oliviero. U. et al., where the prevalence of carotid stenosis in ischemic stroke patients is 43 %, and the study by [16] Kaul, S., et al. in the Indian population in Hyderabad, Telangana, where the prevalence of carotid artery stenosis was 30 % [16][26]. The percentage of patients with significant stenosis- 50 -70 % stenosis and 70 - 99 % stenosis were 14.6 % (22 cases) and 8.7% (13 cases), respectively, and total occlusion was present in 2 patients (1.3 %). The most common site of lesion in patients with significant carotid artery stenosis was the middle cerebral artery territory (31 cases - 83.78 %), followed by the anterior cerebral artery territory (8 cases - 16.21). It was found that the occurrence of carotid artery stenosis increases with increase in age. The maximum number of patients were from the age group of >60 years (56 patients - 80 %), followed by the age group 40 - 60 years and < 40 years, where the number of cases was 13 (18.57 %) and 1 (1.42 %), respectively. This is comparable with the studies by [16] Kaul, S. et al. in the Indian population and [27] Rajamani, K. et al., where the incidence of carotid stenosis was found to increase with age [16][27].

The number of male patients was more than female patients, with a male-to-female ratio of 1.59 :1, comparable with studies by [16] Kaul, S. et al. in Indians [16].

In this study, it was found that the occurrence of carotid artery stenosis was more common in patients with hypertension than those who are non-hypertensive. Hypertension was present in 81.42 % (57 cases) of patients with carotid artery stenosis, which is comparable with the study by [27] Rajamani, K. et al., where the prevalence of hypertension was 88.6 %. The study by [16] Kaul, S. et al. on a study population of 1500 cases showed the prevalence of hypertension in patients with carotid stenosis as 56.4 %, which is less than our study, and it may be due to the difference in sample size [16][27].

It was found that the occurrence of carotid artery stenosis was higher in patients who are diabetic than those who are non-diabetic. Diabetes was present in 45.27 % (32 cases) of patients with carotid artery stenosis, which is comparable with the studies by [16] Kaul S. et al., where the prevalence of diabetes in patients with carotid stenosis was found to be 54.5 % and [27] Rajamani, K., et al. where the prevalence of diabetes mellitus was found to be 36.4 % [16][27].

Limitations Of the Study

The present study is a small sample-sized, observational, institutional study carried out in a short duration of time. Hence, it is difficult to draw a definite inference. Therefore, large, prospective, epidemiological, and analytical studies are required to arrive at a definite conclusion.

Conclusions

The present study showed that there is a significant association between the increase in age, male sex, diabetes mellitus, hypertension, smoking, rheumatic heart disease, and stroke. The most common clinical

feature was unilateral motor weakness of limbs, and the most common site of lesion was the middle cerebral artery territory. CT scan of the brain is helpful in detecting the infarct in most cases. CT scan of the brain may be normal if the CT scan is done within the early time of onset of stroke, in lacunar infarct and posterior fossa lesions. These cases should be evaluated by MRI brain to detect the lesion. Carotid artery stenosis was present in 46.6 % of acute ischemic stroke patients. There is a significant association between the increase in age, male sex, diabetes mellitus, hypertension, and smoking with carotid artery stenosis.

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Appendices

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Government of Assam
Office of the Principal-cum-Chief Superintendent

Gauhati Medical College & Hospital

GUWAHATI -781 032, ASSAM : INDIA

No. MC/ 190/2007/Pt-11/MAR-2019/PG/52,   Date : 10/4/2019

To,

Dr. Nidhin George
PGT,
Department of General Medicine,
Gauhati Medical College & Hospital,
Guwahati-32.

Sub: Study proposal submitted to Institutional Ethics Committee of Gauhati Medical College & Hospital, Guwahati.

This is for your information that the Institutional Ethics Committee of Gauhati Medical College and Hospital, Guwahati in its meeting held on 18th March 2019 at 11:30 A.M. in the Conference Hall of Gauhati Medical College, Guwahati has approved your study proposal as follows.

"STUDY OF CLINICAL PROFILE OF ACUTE ISCHEMIC STROKE AND ITS RELATION WITH CT SCAN BRAIN AND BILATERAL CAROTID ARTERY DOPPLER FINDINGS".

Prof. (Dr.) Joydev Sarma,
Vice-Principal,
Gauhati Medical College & Hospital
Guwahati-32
&
Member Secretary,
Institutional Ethics Committee,
Gauhati Medical College & Hospital,
Guwahati-32
Member Secretary
Institutional Ethics Committee
Gauhati Medical College & Hospital
Guwahati-32

Prof. (Dr.) Probodh Borah,
Professor, Deptt. Of Microbiology,
HOD of Animal Biotechnology,
College of Veterinary Sciences,
Assam Agricultural University,
Khanapara, Guwahati-22
&
Chairman,
Institutional Ethics Committee,
Gauhati Medical College & Hospital,
Guwahati-32
Chairman
Institutional Ethics Committee
Gauhati Medical College & Hospital
Guwahati-32

Figure 16: IRB approval letter

PROFORMA

Patient Name :

Age / Sex :

Occupation :

Hospital number :

Handedness :

Clinical History :

Complaints with duration :

Pasty History - DM/HTN/IHD/RHD/TIA/relevant previous illness

Personal History - Smoking / Alcohol / Tobacco chewing

Figure 17: Questionnaire

Examination :

Pulse :

BP :

Higher mental functions :

Level of sensorium : Alert / Lethargic / Stuporous / Comation

Appearance and behaviour : Emotionally stable / Elated / Depressed / confused

Language : Normal / Broca's aphasia / Wernkke's aphasia / Global Aphasia

Cranial nerves involved :

Examination of fundus :

1.Examination of Motor System :   Right   Left

Bulk

Upper limb

Lower limb

Tone

Upper limb

Lower limb

Power

Figure 18: Questionnaire

Upper limb

Lower limb

Reflex

Biceps jerk

Triceps jerk

Supinator jerk

Knee jerk

Ankle jerk

Plantar

2.Examination of Sensory system :

Touch, Pain and Temperature :

Position sense and vibration :

Signs of incoordination :

3.Other system examination

CVS :

RS :

Abdomen :

Figure 19: Questionnaire

INVESTIGATIONS

1.CT scan brain

Nature of lesion :

Site of lesion :

Midline shift :

Size of the lesion :

2.Carotid Artery Doppler :

3.Other investigation :

ECG :

Hb: TC: DC: Platelets :   ESR:

RBS :

Urea :   Creatinine :   Na+   K+

FLP – Total cholesterol :   TGL: HDL: LDL:

Urine routine :

Figure 20: Questionnaire

CONSENT FORM

I have been fully explained about the nature of the study "**STUDY OF CLINICAL PROFILE OF ACUTE ISCHEMIC STROKE AND IT'S RELATION WITH CT SCAN BRAIN AND BILATERAL CAROTID ARTERY DOPPLER FINDINGS.**" As informed, the study has been conducted for the purpose of research only and the information obtained shall be kept strictly confidential.

I hereby give my consent to participate in the study. I understand that I can withdraw from the study at any point of time.

Signature of the patient.   Signature of the guardian

                                            Relation to the patient

Signature of the investigator   Signature of the witness

        সাক্ষ্যাত গ্ৰহনকাৰীৰদ্বাৰা জননাৰামনত মমাৰ সাথ্যাতকাৰ এক গনৰষণাৰ বানব ম ⊙ৰা হলে।গনৰষণাৰ ববষয়বস্তু. " STUDY OF CLINICAL PROFILE OF ACUTE ISCHEMIC STROKE AND IT'S RELATION WITH CT SCAN BRAIN AND BILATERAL CAROTID ARTERY DOPPLER FINDINGS" এই ববষনয় মই সম্পণভানৰ জ্ঞাত। মমাক জননাৰামনত, এই তথযসমূহ মকৰ মাত্ৰ গনৰষণাৰ বানবনহ বযৱহাৰ কৰা হ'ব আৰু তথযসমূহ সম্পণ মগাপনীয়ভানৰ ৰখ⊙া হ'ব। ইয়াৰদ্বাৰা মই মমাৰ পৰা আহৰণ কৰা তথযসমূহ গনৰষণাৰ বানব বযৱহাৰ কৰৰবল অনুমবত বিন⊙া। মমাক জননাৰা হলে ময়, মই ববচাৰবৰন বযনকানলা সময়মনত এই গনৰষণাৰপৰা বনজৰ নাম প্ৰতযাহাৰ কৰৰব পাৱৰম।

মৰাগীৰ অবভভাৱকৰ স্বাক্ষ   মৰাগীৰ স্বাক্ষ

                                            মৰাগীৰ হসনত সম্বন্ধ

সাক্ষ্যাত গ্ৰহনকাৰী ৰস্বাক্ষ   সাক্ষীৰ স্বাক্ষ

Figure 21: consent form