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**Md. Helal Uddin Bhuiyan**  
Associate Professor & Head,  
Department of Radiology &  
Imaging, Colonel Malek  
Medical College, Manikganj,  
Bangladesh

**Yasmin Rahim**  
Senior Lecturer (Anatomy),  
Dhaka Community Medical  
College & Hospital,  
Moghbazsar, Dhaka,  
Bangladesh

**Corresponding Author:**  
**Md. Helal Uddin Bhuiyan**  
Associate Professor & Head,  
Department of Radiology &  
Imaging, Colonel Malek  
Medical College, Manikganj,  
Bangladesh

## Evaluation of stroke (CVD) patients using computed tomography (CT) at a peripheral medical college hospital in Bangladesh

**Md. Helal Uddin Bhuiyan and Yasmin Rahim**

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### Abstract

As cerebrovascular disease (CVD) is one of the leading causes of morbidity & mortality in adult life, this retrospective study was performed to see the clinical presentation, risk factors, neurological presentation, pattern of brain strokes and areas of brain affected as per CT scan findings in patients at Monno Medical College & Hospital, Manikganj, from 1<sup>st</sup> January 2018 to 31<sup>st</sup> December 2018. In the study it was observed that, cerebrovascular strokes were more common in males (46.73%) than females (34.95%). Most common age group was 61-70 years (33.86%). Most common clinical feature was hemiplegia (51.21%). Most common risk factor was hypertension (39.92%) followed by smoking (20.99%), diabetes mellitus (17.96%), past H/O CVD (14.92%) and dyslipidemia (13.47%). The most common type of stroke was ischemic (81.68%) and hemorrhagic was (18.32%). In ischemic stroke most commonly involved areas were parietal (31.06%) & frontal (15.37%) lobes. In hemorrhagic stroke, most common site was thalamus (5.09%) followed by basal ganglia (3.64%). CT scan remains the useful technique for diagnosis of stroke (cerebrovascular diseases – CVD) because rational management of stroke depends on accurate diagnosis and it should be ideally done in all cases.

**Keywords:** Cerebrovascular disease, computed tomography

### Introduction

Cerebrovascular disease (CVD) is one of the leading causes of death in developed countries after heart disease and cancer, and also became one of the leading causes of death in Bangladesh including peripheral districts. The term stroke means an acute neurological deficit resulting from cerebrovascular insufficiency (CVD) and lasting for more than 24 hours (or causing earlier death). Stroke is not a diagnosis but a clinical syndrome with numerous causes, principally cerebral infarction <sup>[1, 2]</sup> Cerebrovascular disease is a major cause of morbidity and mortality. As there is no specific differentiating feature, clinically in majority of the cases <sup>[3]</sup>, it is difficult to differentiate the type of stroke i.e. ischemic or haemorrhagic. Accurate and early diagnosis may improve the mortality and morbidity. Computed tomography (CT) scan is one of the most accurate methods available for identifying and localizing infarct area in the brain <sup>[4, 5]</sup>. Ischemic or haemorrhagic infarction is well differentiated by CT. Haemorrhagic stroke is due to rupture of vessels, and is usually associated with hypertension. Whereas, in ischemic stroke, thrombotic or embolic occlusion of intra cranial vessels is the major cause. Now-a-days hypertension, smoking & dyslipidemia are reported as commonest cause of stroke among the elderly, and smoking, increased BMI, diabetes and hypertension are significantly associated with strokes among young people <sup>[3]</sup>. This study was undertaken to see the clinical presentation, risk factors, neurological presentation and pattern of brain strokes and areas of brain affected as per CT scan finding in patients at a peripheral medical college hospital in Bangladesh.

### Materials and Methods

824 patients were taken into the study, CT scans done due to acute stroke or H/O stroke from 1<sup>st</sup> January, 2018 to 31<sup>st</sup> December, 2018 in the 500 bedded Monno Medical College & Hospital, Manikganj. Scans were done on Siemens Somatom Emotion Sixteen slice CT scan machine with spiral scan facility. The Medical College has all the basic departments like Medicine, Neuromedicine, Surgery, Pediatrics, Obs & Gynae etc. CT scans were performed with axial (basal & cerebral) sequences with CVD as the clinical basis of diagnosis.

Patient history and clinical diagnosis were recorded from the registrar book which was recorded at the time of CT scan. CT scans were done to those patients who came to Monno Medical College & Hospital directly or came as referral patients from nearby hospitals & general practitioners. All patients above 18 years of age and having clinical & CT confirmed diagnosis of stroke were included in the study. CT scans were done in 2104 cases during the period of study (1<sup>st</sup> January 2018 to December 2018). Among them 824 cases were diagnosed as CVD, 93 cases as brain tumor, fracture etc. and the rest 1187 cases had normal findings. Patients below 18 years and those patients confirmed of not having CVD by CT scan were excluded from the study.

**Results**

CT scans of 824 cases were diagnosed as CVD in Monno Medical College & Hospital, Manikganj during the period of 1<sup>st</sup> January 2018 to 31<sup>st</sup> December 2018. These cases were studied & evaluated for clinical profile & frequency of risk factors.

**Incidence in age**

The age of the subjects ranged from 20 to 100 years, with a mean age of 63 years. In this study the youngest patient was 24 years of age & the oldest one was 100 years. The incidence of stroke was maximum in the age group 61-70 years (33.86%) of total patient (Table-1).

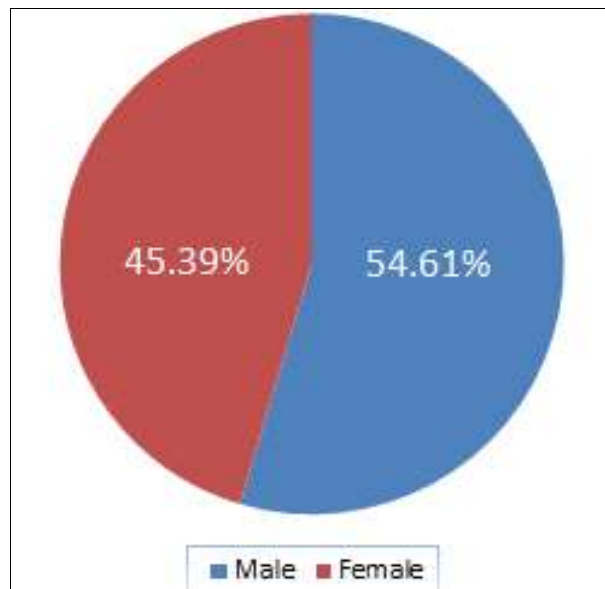
**Table 1:** Frequency & Percentage of cases according to age groups

Age Group (years)	Frequency	Percentage
20-30	7	0.85%
31-40	21	2.55%
41-50	60	7.28%
51-60	174	21.11%
61-70	279	33.86%
71-80	190	23.06%
81-90	67	8.13%
91-100	26	3.16%
Total	824	100%

**Sex Distribution of Stroke patient**

Out of total 824 diagnosed patients, 450 (54.62%) were

male & 374 (45.38%) were female (Fig. 1). The Male: Female ratio was 1.2: 1.



**Fig 1:** Sex distribution of Stroke patient.

**Percentage of risk factors in stroke patient**

In the study, common risk factor was Hypertension (HT) with 39.92% incidence, followed by smoking 20.99%, diabetes mellitus (DM) 17.96%, past H/O CVD 14.92% dyslipidemia 13.47% (Table 2).

**Table 2:** Frequency & Percentage of Risk Factors of Stroke

Risk Factor	Frequency	Percentage
HT	329	39.92%
DM	148	17.96%
Dyslipidemia	111	13.47%
Smoking	173	20.99%
Past H/O CVD	123	14.92%

**Clinical Presentation of stroke patient**

In our study the most common clinical presentation was hemiplegia which was 51.21% followed by speech involvement 25.97% (Table-3).

**Table 3:** Frequency & Percentage of clinical features of stroke patient

Clinical Feature	Frequency	Percentage
Altered Sensorium	115	13.95%
Convulsion	41	4.98%
Inability of gait	32	3.89%
Hemiplegia/Paresis	422	51.21%
Speech Involvement	214	25.97%

**Type of Stroke**

In our study, it was observed that 673 patients (81.68%) suffered from ischaemic stroke, and 151 patients (18.32%) suffered from hemorrhagic stroke. So, the most common type of stroke was ischaemic variety. Also out of 673

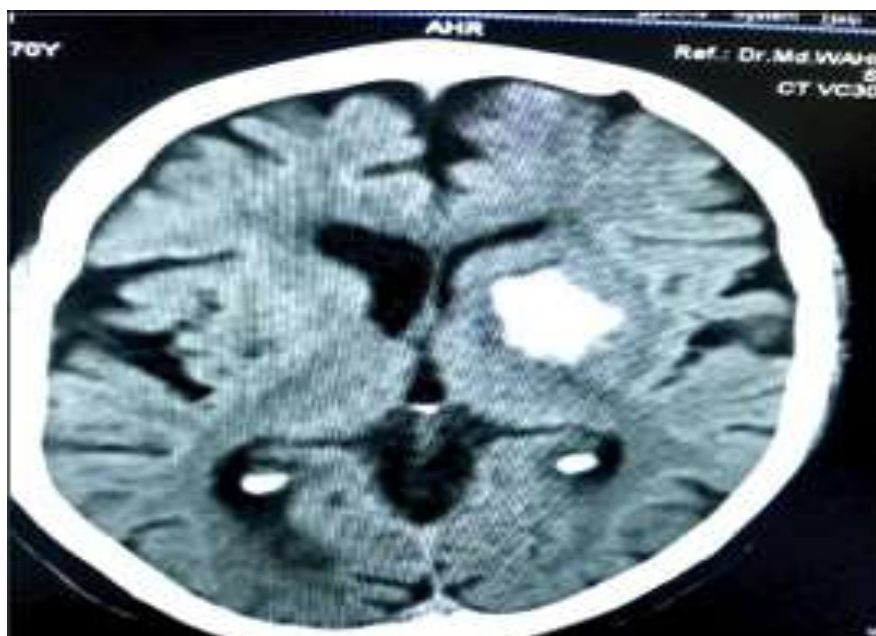
ischaemic stroke patients 385 (46.73%) were male and 288 (34.95%) were female. Second most common type of stroke was haemorrhagic, which was (18.32%). Out of 151 haemorrhagic stroke patient 65 (7.89%) were male & 86 (10.43%) were female (Table 4).

**Table 4:** Gender wise frequency of different type of stroke

Gender	Type of stroke				Total
	Ischaemic		Haemorrhagic		
Male	Count	385	Count	65	450
	Percentage	46.73%	Percentage	7.89%	
Female	Count	288	Count	86	374
	Percentage	34.95%	Percentage	10.43%	
Total	Count	673	Count	151	824
	Percentage	81.68%	Percentage	18.32%	



**Fig 2:** CT Scan of Brain: Right Parietal Acute Haemorrhage with Ventricular Extension (MCA).



**Fig 3:** CT Scan of Brain : Left Basal Ganglion Acute Haemorrhage In Left MCA Territory.



**Fig 4:** CT Scan of Brain: Left sided Large Acute Sub-Dural Hemorrhage (SDH).



**Fig 5:** CT Scan of Brain : Left MCA Territory Large Acute Infarct.

**Site of involvement of lesion:**

In this study most common site of infarction was parietal (33.8%) followed by frontal (16.8%) and involvement of

basal ganglion was (11.1%). The most common site of hemorrhage was thalamus (25%) followed by ventricle (19%), hemorrhage in basal ganglia was (15%) (Table 5).

**Table 5:** Topographic distribution of Cerebral Haemorrhage & Infarction

Affected area of Brain on CT scan	Cerebral Infarction		Cerebral Haemorrhage	
	Freq.	Perc.	Freq.	Perc.
Brain Stem	5	0.60%	--	--
Thalamus	19	2.30%	42	5.09%
Basal Ganglion	94	11.40%	30	3.64% (Fig: 3)
Paraventricular	35	4.24%	4	0.48%
Ventricular/SAH/SDH	--	--	29	3.51% (Fig: 4)
External/Internal Capsule	35	4.24%	9	1.09%
Cerebellar	24	2.91%	6	0.72%
Frontal	130	15.77%	10	1.21%
Parietal	256	31.06% (Fig:5)	27	3.27% (Fig: 2)
Temporal	20	2.42%	10	1.21%
Occipital	51	6.18%	--	--

## Discussion

CT is helpful in differentiating different type of stroke (CVD) & also helps in early diagnosis. This study performed for a year in a peripheral district medical college & hospital has proved that CT scan is helpful in differentiating haemorrhagic and ischaemic type of strokes. It also aids in accurate diagnosis & further management. The mean age observation of 63 in our study closely matches with the study done by Vaidya CV *et al.* (mean age 61) [3] & Maskey *et al.* (mean age 63) [6]. The common age group presented is between 61-70 year, which closely correlates with the study done by Maskey *et al.* [6] & Vaidya CV *et al.* [3]. The male to female ratio is 1.2: 1 which correlate with the study of Vaidya CV *et al.* (1.4:1) [3] but a bit less than the male female ratio in the study done by Aiyar *et al.* (1.9:1) [4]. Stroke in young patients (age<45 year) comprised of about 10.67% of all patients which is close to the study done by Abdul Sallam *et al.* (13.6%) [5] and Vaidya CV *et al.* (15%) [3]. In this study the most common clinical presentation was haemiplegia/hamiperesis followed by speech involvement which is close to the study done by Vaidya CV *et al.* [3] and Sanjeev Suman *et al.* [1]. In our study the most common risk factor was hypertension (39.92%) which correlates with study done by Eapen *et al.* (40%) [7], followed by smoking (20.99%), DM (17.96%) which correlates with Vaidya *et al.* [3]. The most common type of stroke was ischaemic that is cerebral infarction 81.68% which correlated with studies done by Aiyar *et al.* (70%) [4], in Eapen *et al.* (68%) [7], Devinchand *et al.* (75%) [8] & Vaidya CV *et al.* (75.1%) [3]. The second most common types of stroke was haemorrhage 18.32% which correlates with the study done by, Devichand *et al.* (25%) [8], Aiyar *et al.* (26%) [4], Eapen *et al.* (32) [7] & Mark MP *et al.* [9]. In our study, the most common site of infarction was parietal 31.06% followed by frontal 15.77%, basal ganglion 11.40%, correlated with Eapen *et al.* [7], Vaidya CV *et al.* [3] & Mukherjee *et al.* [10]. The most common site of haemorrhage was thalamus 5.09% followed by basal ganglion 3.64% & ventricular region 3.51%. These datas correlate with the study done by Eapen *et al.* [7], Vaidya CV *et al.* [3] & Gaskill *et al.* [11]

## Conclusion

Stroke in our country is on the rise even on peripheral district levels. The occurrence rises with age, the peak between 60 to 70 years. This study shows male predominance in stroke cases where infarction was more than hemorrhage. Males were more affected than females in ischemic stroke but for hemorrhage, incidence was higher in

cases of female. CT scan is an important technique for diagnosis of acute stroke. Rational management of stroke depends on accurate diagnosis and it should be done in all cases.

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## Conflict of Interest

Not available

## Financial Support

Not available

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