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ASSOCIATION OF CT SCAN FINDINGS WITH SHORT TERM OUTCOME OF ACUTE ISCHAEMIC STROKE

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ABSTRACT

Background: Stroke is the most common cause of morbidity and mortality worldwide. There are two types of stroke, ischaemic stroke and haemorrhagic stroke. The most important diagnostic tool of acute stroke is CT scan of brain. In acute ischaemic stroke, there are diverse CT scan findings especially in respect of anatomic location of ischaemic change or character. After the event of acute ischaemic stroke the patient may become completely stable or may develop complications or may die within a few days. **Objective**: This study is designed to determine the relationship between CT scan findings and short term outcome of acute ischaemic stroke. **Methodology**: This is a prospective observational study done in Rangpur Medical College Hospital during the period of July, 2015 to June,2017. Total 60 cases were enrolled from the admitted patients in Medicine and Neuro medicine department of Rangpur Medical College Hospital, in this study by purposive consecutive sampling technique fulfilling the inclusion and exclusion criteria. CT scan of brain was done for each patient after taking informed consent. Radiological evidence of acute ischaemic stroke was ascertained by radiologist. Data were collected from each patient and/or attendants by taking meticulous history, clinical examination and relevant investigations. Clinical status and afterwards outcome after 7 days of admission was measured by Modified Rankin Scale. All data were collected in individual predetermined case record form and analysed by SPSS version 17.0. **Results**: Total number of patients was 60. Male female ratio was 1.2:1. During study period 22% (N=13) died out of 60 patients. Thirty six (60%) patients had infarction due to proximal occlusion of artery mostly middle cerebral artery and 24(40%) patients had lacunar infarcts. Morbidity was measured by modified Rankin scale at the time of admission and during follow up after 7 days. Morbidity was found to be significantly increased in proximal occlusion stroke than lcunar sroke (P value <0.05). Mortaliy was also significantly higher in proximal occlusion stroke than lacunar stroke (P value 0.04). **Conclusion**: In this study it is found that CT scan findings can predict the short term outcome of acute ischaemic stroke. This will provide insight about better understanding in predicting accuracy of CT scan of brain.

KEYWORDS: Ischemic stroke, CT scan, Modified Rankin Scale, Ischemic infarction of brain.

INTRODUCTION

Stroke can be defined as "Acute focal brain dysfunction due to vascular cause".[1] The recommended standard WHO stroke definition is "A focal (or at times global) neurological impairment of sudden onset, and lasting more than 24 hours (or leading to death) and of presumed vascular origin".[2] Approximately 15 million stroke events occur worldwide each year; two-thirds of these events occur in people living in low-income and middle-income countries.[3-5] Stroke is the second leading cause of death worldwide.[6] Patients who have experienced a stroke will most likely be taken to a nearby hospital. Upon arriving at the hospital, medical staff will attempt to treat the patient, considering the clinical presentation together with information obtained from an emergency non-contrast computed tomography (CT) scan of the patient's brain.[7] Eligibility for stroke treatment depends not only upon time from stroke onset, but also on the extent of ischemic damage on CT scans. Changes on the CT scan denote predominately irreversibly infarcted tissue that appears hypodense, representing the infarct core. In the first 6 hours

following stroke onset, stroke detection is challenging and requires significant expertise, as only subtle signs of cerebral ischemia are present on CT.[8] These include hyperdense artery sign, the insular ribbon sign, obscuration of the lentiform nucleus, blurring of grey-white matter differentiation, and sulcal effacement.[9] Neurologic symptoms caused by focal brain ischemia do not necessarily represent irreversible brain damage. The critical perfusion level for functional disturbance is at 15–25 mL/100 g per minute and above the critical perfusion level for tissue death (10–15 mL/100g per minute). Neuronal tissue can survive with cerebral blood flow values higher than 12 mL/100 g per minute in a state of dysfunction for an undefined period. This difference in critical blood flow levels for reversible dysfunction and irreversible tissue damage allows spontaneous or treatment-induced recovery. The CT changes of acute infarction can be subtle within the first several hours of symptom onset. These findings include hypodensity with loss of gray-white differentiation and effacement of sulci. The CT indicators of acute ischemia are related to edema, which causes a decrease in the attenuation of involved structures.[10,11] Density changes have been found to be the most frequent sign of early ischaemia. CT scanning has demonstrated a possible role as a prognostic and triage test. The observation of early infarct signs involving extensive areas of the middle cerebral artery territory has been implicated in poor outcome. With the widespread availability of CT scanning, studies such as this suggest that CT can be applied as a screening tool in the setting of acute ischemic stroke.[12] The primary outcome measure of stroke is poor clinical outcome assessed by the mRS.[13] A score of 0–2 represents good outcome, and a score of 3–6 represents poor outcome.[14]

OBJECTIVE
General objective
- Association of CT Scan Findings with Short Term Outcome of Acute Ischaemic Stroke

Specific objective
- To identify CT scan findings of acute ischaemic stroke
- To find out the association of CT scan findings with Modified Rankin Scale of acute ischaemic stroke
- To find out short term outcome of Modified Rankin Scale of acute ischaemic stroke.

METHODOLOGY
Study type
- It was a prospective observational study

Place of study
- Department of Medicine and Neuromedicine, Rangpur Medical College Hospital, Rongpur

Period of study
- 24 months (July 2015 to June 2017)

Sampling method
- Purposive sampling method

Study population
- All ischemic stroke patients admitted in the department of Medicine and Neuromedicine, Rangpur Medical College Hospital, Rangpur.

Selection criteria
Inclusion criteria
- All ischemic stroke patients irrespective of age and sex

Exclusion criteria
- Stroke with other systemic disease.eg. DM, IHD,CKD
- Stroke with pregnancy.
- H/O previous stroke

Procedure of data collection
Data was collected and recorded from standard pre-designed data collection form.

Statistical analysis
All data generated was statistically analyzed using the computer based SPSS (Statistical Package for Social Science) in 17.0 version of windows. Levels of significance was calculated at a confidence interval of 95% ($P<0.05$) by using t test.

RESULTS
During the study period from July 2015 to June 2017, a total 60 patients of ischaemic stroke were enrolled in this study to see the association of CT scan findings with their short term outcome. Short term outcome was measured by modified Rankin Scale during the time of hospital admission and upto 7 days of in hospital follow up.

Age distribution of patients in this study was ranging from 29 to 83 years. Occurance of ischaemic strokes were more in middle and advanced aged people. Of the total 60 patients, most of the patients 18(30%) patients were in the age group 61-70 years.

Both male and female patients were included in this study by purposive sampling method. Among them 33(55%) were males and remaining 27(45%) patients were females in the enrollment.

Age distribution of the patients (n=60).

Table I: showing age distribution of patients. Most patients are in the group of age 61-70 years (30%).

Age in years	Frequency	Percentage (%)
<31	1	1.7
31-40	2	3.3
41-50	11	18.3
51-60	14	23.3
61-70	18	30.0
71-80	12	20.0
>80	2	3.3
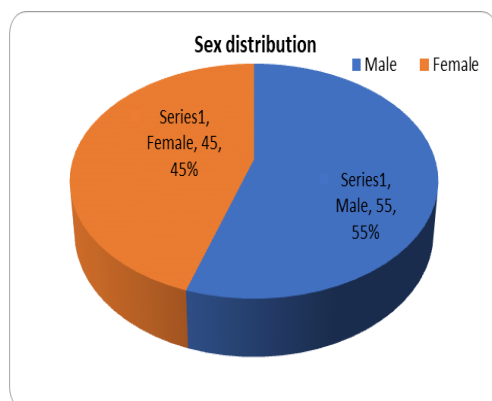
Figure I: Sex distribution.

Among 60 patients, 33(55%) were male and 27(45%) were female. Male female ratio was 1.2:1. The low, middle and high socio-economic status of patients were respectively 58.33%, 31.67% and 10% of total patients.

In proximal occlusion stroke patients of low socio-economic status was 30.2% and in lacunar stroke was 28.13%. In statistical analysis it is found that p value is 1.39, that indicates there was no significant difference. Like this regarding middle and high socio-economic status there was no statistically significant difference in between proximal occlusion stroke and lacunar stroke (P value 0.95 in middle class and 0.52 in high class).

Residence of most patients 46(76.67%) of this study was in rural area. In proximal occlusion stroke and lacunar stroke, p-value was not significant, that is there was no significant difference in occurance of stroke in respect of residence.

About half of the patients (51.67%) were current smokers, 20% of them were ex-smoker and remaining 28.33% were nonsmoker. In both proximal occlusion and lacunar stroke had statistically insignificant p-value of smoking status.

Family history was found to be positive only in 18.33% of patients. Both positive and negative family history had no statistically significant difference in between proximal occlusion stroke and lacunar stroke.

Among female patients 22.22% had the history of OCP intake. In proximal occlusion stroke, history of OCP intake was significantly higher than that of lacunar stroke. P-value was 0.03, that was statistically significant.

Socio-economic status of patients

Table II: showing most of the patients are of low socio-economic status in both proximal occlusion and lacunar stroke.

Socioe-economic status	Prox.occl. stroke(%)	Lacunar stroke(%)	P value
Low	30.2	28.13	1.39
Middle	16	15.67	0.95
High	6	4	0.52

Distribution of patients according to family history of stroke

Table III: Most of the patients came from rural area in both proximal occlusion and lacunar stroke.

Residence	Prox.occl. stroke(%)	Lacunar stroke(%)	P value
Low	30.2	28.13	1.39
Middle	16	15.67	0.95
High	6	4	0.52

Distribution of patients according to family history of stroke

Table IV: showing most patients have negative family history in both proximal and lacunar stroke.

Family history	Prox.occl. stroke(%)	Lacunar stroke(%)	P value
Positive	10.12	8.21	0.65
Negative	36.32	45.35	0.31

Smoking status of the patients

Table V: shows most of the stroke patients are current smoker. Distribution of female patients with history of OCP use.

Smoking status	Prox.occl. stroke(%)	Lacunar stroke(%)	P value
Smoker	30.11	21.56	0.23
Nonsmoker	16.12	12.21	0.46
Ex smoker	12.23	7.77	0.32

Table VI: Among OCP user Incidence of proximal occlusion stroke is significantly higher than that of lacunar stroke.

OCP user	Prox.occl. stroke(%)	Lacunar stroke(%)	P value
Yes	16.11	6.11	0.03
No	40.45	37.33	0.72

DISCUSSION

This study was done to see the association of CT scan findings of acute ischaemic stroke patients with their short term outcome. The outcomee were expressed as mortlity and morbidity. Mortality was calculated during 7 days period of hospital stay. Morbidity was measured by modified Rankin scale score system after 7 days period of follow up.

Regarding sex distribution 55% was male and 45% was female. 60% patients were affected in large arterial territory and 40% patients were affected as lacunar stroke. In this study it is found that proximal oclusion stroke is associated with significantly higher morbidity. Morbidity was measured by disability assessment tool, Modified Rankin Scale (MRS) scoring system. Mean MRS was significantly higher in proximal occlusion stroke than that of lacunar stroke both on hospital admission and during the time of follow up after 7 days. In previous study, neurological deterioration which reflects worsening of neurological symptoms is relatively common in acute pontine infarction cases and ranges from 14 to 35% according to different reports.[15-18] Pontine stroke is included in proximal oclusion stroke. So this study result is similar to previous study report. Moreover proximal occlusion includes other part of brain. So in this study the prevalence of proximal occlusion stroke is higher, that is 40%. Corticospinal tract in the midbrain are located in the middle of the cerebral peduncle compact bundles. So in acute ischaemic stroke, the involvement of large aterial territoty may be associated with larger damage of motor fibers in comparison with smaller damage in lacunar involvement. Despite significant achievement in the acute management and treatment of stroke, it remains the third leading cause of death in industrialized countries.[19,20] Nowadays, upto 10% of patients with an acute ischamc stroke die within 30 days of the ictus.[21] Rothwell et al. reported a 17.2% case fatality due to initial stroke in the Oxford Community Stroke Project and 17.8% in the Oxford Vascular Study.[20] In this study the overall mortaliy was found 22% that is near about to previous results.

CONCLUSION

In this study it has been found that CT scan findings in respect of area of brain involvement is associated both mortality and morbidities of patients affected by ischaemic stroke. So the outcomes of acute ischaemic stroke patients can be predicted by the seeing the radiological area of brain involvements and appropriate measure can be taken immediately.

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