

# Computed Tomography Findings in Acute Stroke Patients in a Tertiary center

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Received: 13<sup>th</sup> April, 2024

Accepted: 14<sup>th</sup> May, 2024

Published: 10<sup>th</sup> June, 2024

## ABSTRACT

**Background:** Stroke, or "cerebrovascular accident," is a medical disorder in which the brain's cells die due to insufficient blood flow. Successful stroke treatment varies according to the type of stroke, whether an infarct or a bleed, and it can be lethal without brain damage. The study aim was to compare clinical stroke diagnosis with computed tomography (CT) scan findings to determine stroke type (hemorrhagic or Ischemic).

**Methods:** This is a descriptive cross-sectional type of study conducted at the Department of Radiology & Imaging in a diagnostic center at central Nepal from December 2023 to February 2024. A total of 120 patients from the inclusion criteria were taken for the study purpose. Data of clinical diagnosis were compared individually with CT findings.

**Results:** Out of 120 patients, 76 were males and 44 were females and they were in the age range of 40 to >70 years. Clinically 59 patients were suspected to have Intermediate (hemorrhagic) infarct, 44 acute cerebral infarct and 17 Intra cerebral hemorrhage. CT scan of the brain showed 58 acute cerebral infarct, 36 Hemorrhagic infarct, 15 Intra cerebral hemorrhage and 7 Space occupying lesion.

**Conclusion:** The study found that CT should be the first thing to do when a person has a stroke because it's easy, quick, and accurate at figuring out infarct and hemorrhage which decides the treatment at a glance.

**Keywords:** stroke; computed tomography.

## INTRODUCTION

When blood flow to a portion of the brain is interrupted, a stroke occurs. This can result in long-term brain damage, incapacity, or death.<sup>1</sup> In two types of stroke ischemic is the most frequent (87%). The hemorrhagic stroke happens as a result of vessel rupture, caused by aneurysms or arteriovenous malformations.<sup>2</sup> In light of the therapeutic implications, it is critical to distinguish between hemorrhagic and ischemic strokes.<sup>3</sup> However, the clinical distinction has proven challenging, as minor hematomas can produce symptoms and signs comparable to those generated by infarcts.<sup>4</sup> Brain CT scans have become the most widely utilized primary radiologic examination into clinical practice.<sup>5</sup> A head CT scan can immediately show the location and size of brain anomalies like blood clots or tumors. It also can reveal infections or areas of the brain tissue is withering or dead. CT scan can determine if a stroke is ischemic or hemorrhagic. In stroke CT scan helps to detect blood in the skull from a hemorrhage, ensuring proper treatment.<sup>6</sup> An

ischemic stroke occurs when there is a lack of blood flow; a hemorrhagic stroke occurs when there is bleeding, and a thrombotic stroke occurs when fatty deposits accumulate in vessels and causes blockage.<sup>7</sup> One-sided inability to move, difficulty speaking, loss of vision on one side, headache are possible clinical manifestations. Therapies will be determined by how accurately the diagnosis was performed. Incorrect diagnosis may result in dangerous treatments.<sup>8</sup> This study compared the clinical diagnosis with CT to determine type of acute stroke (hemorrhagic or Ischemic).

## METHOD

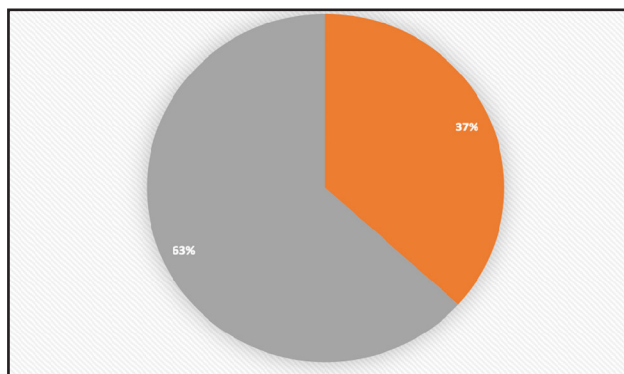
Cases from December 2023 to February 2024, 120 patients referred to Radiology departments were included in this cross-sectional and observational study with IRC no Ref: 077/78-019. CT scans of the brain were performed on all individuals with a clinical diagnosis of the acute stroke where indicated, clinical diagnosis, age, sex, the onset of symptoms, and time of hospitalization are included. Patients

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who presented with a fast onset of coma, rapid deterioration of neurological status, severe headache, severe vomiting, neck stiffness, and hypertension were diagnosed with hemorrhagic stroke. Patients presenting with a sudden start of lateralizing size, particularly those with atrial fibrillation, rheumatic heart disease, recent myocardial infarction, and carotid bruit, were deemed to have a cerebral infarction. Blood sugar, lipid profile, ECG, and echocardiography were all performed in addition to the standard investigation. Every patient underwent a cerebral CT scan. Finally, the CT scan findings and data Analysis was SPSS 20. Version used to analyze the results clinical diagnosis were compared separately in order to ascertain the specific clinical diagnosis.

## RESULTS

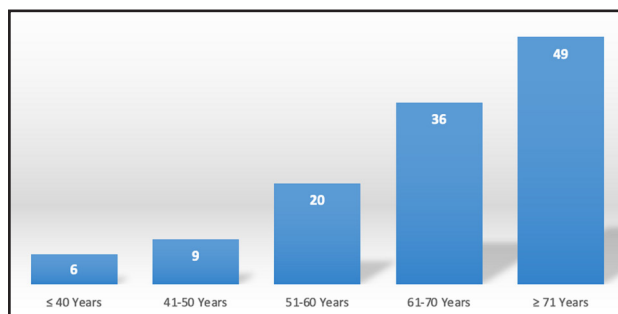
Figure-1 has shown that, seventy six patients (63.3%) of acute stroke among one hundred and twenty were male and forty four patients (36.7%) were female. Most of the patients (forty nine, 40.8%) were from the age group  $>71$ . Thirty-six patients (30.0%) were from the age group 61-70. Twenty patients (16.7%) from 51-60, nine (7.5%) from 41-50 and six (5.0%) were from age group  $\leq 40$  years (Figure 1).



**Figure 1. Sex distribution of acute stroke patients**

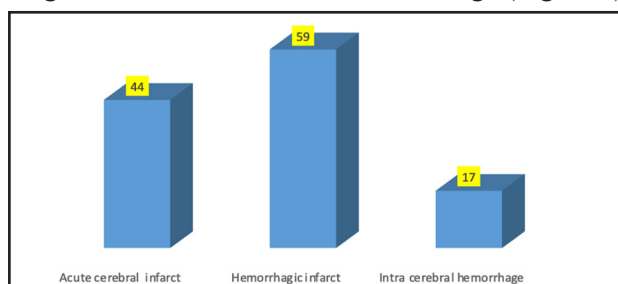
Figure-2 has shown that, most of the patients (forty nine, 40.8%) were from the age group  $>71$ . Thirty-six patients (30.0%) were from the age group 61-70. Twenty patients (16.7%) from 51-60, nine (7.5%) from 41-50 and six (5.0%) were from age group  $\leq 40$  years (Figure 2).

Figure-3 has shown that, most of the patients (fifty-



**Figure 2. Age distribution in Patients of Acute Stroke (n=120).**

nine, 49.2%) with acute stroke were clinically diagnosed with Hemorrhagic infarct whereas forty four patients (36.7%) were diagnosed with acute cerebral infarct. seventeen patients (14.2%) were diagnosed with Intra cerebral hemorrhage (Figure 3).



**Figure 3. Clinical diagnosis of the type of acute stroke (n=120).**

Table-1 has indicated that, fifty-eight patients (48.3%) had acute cerebral infarct behind the acute stroke. Thirty six patients (30.0%) had a Hemorrhagic infarct and 19 (15.8%) had Intra cerebral hemorrhage behind the acute stroke. Only seven patients (5.9%) had Sol. All of the patients with acute stroke in this table were diagnosed through a CT scan.

Table-2 has shown that, among ninety patients forty four had been clinically diagnosed with acute cerebral infarct and among them, thirty six patients were diagnosed through CT scan where fifty-nine patients had been diagnosed with Hemorrhagic infarct and among them, fourteen patients were diagnosed with

## DISCUSSION

Stroke is a serious life-threatening medical condition that occurs because of poor blood flow to the brain which causes cell death. As clinical examination alone is not enough to differentiate ischemic stroke from hemorrhagic, a CT scan or magnetic resonance imaging (MRI) is needed. Brain imaging helps

Specific type of acute stroke	Frequency (%)
Acute cerebral infarct	58(48.3)
Hemorrhagic infarct	36(30.0)
Intra cerebral hemorrhage	19(15.8)
Sol	7(5.9)

Specific type of acute stroke	Clinical Diagnosis	CT Scan Confirmation	Agreement of Results
Acute cerebral infarct	44	36	58.8
Hemorrhagic infarct (Indeterminate)	59	14	61.1

clinicians make management decisions and decide whether to employ antiplatelet or thrombolytic medications for acute stroke. The burden of stroke is substantial, which is due not only to its high mortality but also to its associated morbidity. A clinical diagnosis that is incorrect has a significant impact on the patient's outcome. Without a doubt, computed tomography scans significantly improve stroke diagnosis. Reliance on clinical diagnosis alone for acute stroke is unjustifiable, much more so now that CT is widely available. The clinical diagnosis of the patients in this study was only 75% accurate when compared with the findings of the CT scan, which revealed a misdiagnosis rate of 25%. This finding of the inadequacy of the clinical diagnosis is consistent with the findings of Salawu et al., who noted a misdiagnosis rate of 15% when comparing clinical diagnosis with CT scans in Maiduguri.<sup>9</sup> In a similar study conducted in Ethiopia, Asefa et al., reported a misinterpretation rate of 30% in relation to clinical diagnosis.<sup>10</sup> In a study of 156 Nigerian patients, Ogun et al., found 44% misinterpretation rate when comparing CT findings with clinical diagnosis.<sup>11</sup> To assist physicians in making clinical diagnoses, several scoring systems such as the "Allen score" and the "Siriraj score" have been invented to assess the relative chance of infarction or hemorrhage.

While clinical diagnoses made with these scores appear to be more accurate than those made with a physician's clinical eye, they also introduced some complications. Thus, throughout the last decade, the "Allen score" (also known as the Guy's Hospital score), a verified clinical measure, acquired widespread support but has since waned. In a study of 1059 patients in Glasgow, it was determined that the Guy's Hospital score had a sensitivity of 70% for diagnosing hemorrhage and a specificity of 64% whereas the siriraj score had a sensitivity of 68% and a specificity of 64%. This study indicated that neither score is beneficial for excluding bleeding prior to initiating anticoagulant therapy.<sup>12</sup> Badam et al., examined the Siriraj stroke score and Guy's Hospital score in an Indian environment.<sup>13</sup> Both of the above-mentioned ratings were found to be insufficient for conclusively identifying bleeding or infarct in this investigation. The outcomes of this study underscored the critical nature of routine CT scans in acute stroke patients, as they are widely available at all hours of the day and night at large hospitals and produce images fast. Additionally, CT scans offer distinct diagnostic benefits since they rapidly rule out hemorrhages and can reveal even a small tumor that may mimic a stroke.

## CONCLUSION

While significant advances in stroke imaging have been made, including CT perfusion imaging, Xenon CT, CT angiography, MR diffusion imaging, MR perfusion imaging, and MR angiography, the study discovered that clinical diagnosis of acute stroke alone is frequently insufficient, resulting in a high risk of poor patient morbidity. As a result, it is critical that CT be used whenever possible in acute stroke therapy.

**Conflict of interest:** None

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**Citation:** Agrahari MK, Singh R, Shah KK, Shrestha JK, Kadel B. Computed Tomography Findings in Acute Stroke Patients in a Tertiary center. *JNHLS*. 2024; 3(1):26-29.