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ORIGINAL

# Patterns of computed tomography imaging findings in patients diagnosed with cerebrovascular accident in Nigeria: a single center study

## Patrones de hallazgos en imágenes de tomografía computarizada en pacientes diagnosticados de accidente cerebrovascular en Nigeria: estudio de un solo centro

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## ABSTRACT

**Introduction:** stroke is a major challenge to physicians worldwide, with high incidence, mortality, disability rates, and costs. This study was designed to evaluate the patterns of computed tomography imaging findings in patients diagnosed with cerebrovascular accident in Nigeria.
**Mathod:** a cross-sectional retrospective study design was adopted to select 320 patients with stroke who underwent CT imaging at a radiological facility in Ibadan, Nigeria. Data such as CT imaging findings in CVA, age and gender of the patients were collected from the CT radiological reports archive for cases done from January 2023 to October 2023.
**Results:** males were highest 208 (65 %) and the majority 104 (32 %) were within the age group of 60-69years. Based on CT findings, the majority 180 (56,3 %) was haemorrhage and the least 20 (6,3 %) was transient ischemic attack. Out of 120 cases of infarcts, 27 (22,5 %) were female and males were 110 (61,1 %) out of 180 cases of haemorrhagic CVA.
**Conclusion:** male preponderance was noted in this study. Older adults were commonly affected and haemorrhagic CVA was the commonest CT imaging finding. Improving access to health care for males, and increasing screening and early detection of CVA, could also help to reduce the gender disparity.

**Keywords:** Cerebrovascular Accident; Computed Tomography; Haemorrhagic.

## RESUMEN

**Introducción:** el accidente cerebrovascular es un reto importante para los médicos de todo el mundo, con una alta incidencia, mortalidad, tasas de discapacidad y costes. Este estudio se diseñó para evaluar los patrones de los hallazgos de las imágenes de tomografía computarizada en pacientes diagnosticados de accidente cerebrovascular en Nigeria.
**Método:** se adoptó un diseño de estudio retrospectivo transversal para seleccionar a 320 pacientes con accidente cerebrovascular a los que se les realizó una tomografía computarizada en un centro radiológico de

Ibadan, Nigeria. Los datos como los hallazgos de imágenes de TC en el ACV, la edad y el sexo de los pacientes se recopilaron del archivo de informes radiológicos de TC para los casos realizados desde enero de 2023 hasta octubre de 2023.
**Resultados:** el sexo masculino fue el más numeroso 208 (65 %) y la mayoría 104 (32 %) estaban dentro del grupo de edad de 60-69 años. Según los hallazgos de la TC, la mayoría (180, 56,3 %) eran hemorragias y la menor parte (20, 6,3 %) eran accidentes isquémicos transitorios. De los 120 casos de infarto, 27 (22,5 %) eran mujeres y 110 (61,1 %) varones de los 180 casos de AVC hemorrágico.
**Conclusiones:** en este estudio se observó una preponderancia masculina. Los adultos mayores se vieron afectados con mayor frecuencia y el AVC hemorrágico fue el hallazgo más frecuente en las imágenes de TC. La mejora del acceso de los varones a la atención sanitaria y el aumento del cribado y la detección precoz del AVC podrían contribuir a reducir la disparidad de género.

**Palabras clave:** Accidente Cerebrovascular; Tomografía Computarizada; Hemorrágico

## INTRODUCTION

Stroke is a major challenge to physicians worldwide, with high incidence, mortality, disability rates, high medical costs and it remains the third leading cause of death globally and the leading cause of serious long-term disability worldwide.[1,2,3,4] This disease was thought to be rare in the black Africans five decades ago, but strong evidences support an emerging epidemic of stroke in developing countries following social and economic re-structuring over the next few decades.[2]

Though the situation in sub-Saharan Africa is peculiar as significant mortality accrues to infectious diseases such as human immuno-deficiency virus/ acquired immune-deficiency syndrome (HIV/AIDS) and malaria, there are however reports indicating that stroke had become the leading cause of neurological admissions in most tertiary hospitals in Nigeria, taking over from central nervous system infections reported in earlier studies.[5] Stroke accounted for 0,92 – 4 % of hospital admissions and 2,83 – 4,52 % of total deaths in Nigeria.[5]

The actual incidence of stroke in Nigeria has not been established but there are indications that the incidence is likely to be high and the mortality increasing as in other African countries. In a community study of neurological disorders among Nigerians, Osuntokun et al.[6] reported a crude prevalence rate of 58 per 100,000 of population, similar to the figure by Matenga in Zimbabwe. More recently, community surveys undertaken in South Africa, Togo and Tanzania suggest the prevalence of stroke to be between 200 and 300 per 100,000.[7]

Cerebrovascular disease (CVD) is one of the most common reasons for neurological emergencies and constitutes a serious public health problem.[8] It is reported that most cases of strokes that occur globally, affect all age groups, from neonates to elderly people, with occurrence rates rising by age.[4] The lifetime risk of overt stroke is estimated at one in four by age 80 years, and the lifetime risk of silent or covert stroke is likely closer to 100 %. Globally, stroke is the second leading cause of death.[1] The lifetime risk of overt stroke is estimated at one in four by age 80 years, and the lifetime risk of silent or covert stroke is likely closer to 100 %.[9] In industrialized countries, stroke accounted for 10-12 percent of all deaths, with about 88 % of the deaths attributed to stroke occurring among people over 65 years. Stroke affects men and women equally and causes major social and economic burdens to society, with direct costs above $3 billion annually in Canada.[9]

In managing acute stroke, time is of the essence as a 'golden hour' is available for making prompt diagnostic and therapeutic decisions to minimize complications.[4] However, the ultimate diagnosis is primarily determined by imaging, and choosing the most appropriate imaging technique can result in an early and potentially life-saving diagnosis of acute stroke.[1,3,4] CT is the preferred imaging modality for the initial evaluation of stroke patients because it can quickly and accurately identify the presence of haemorrhage. Computed tomography imaging having wider availability, being cost effective and less time consuming, plays the role of first-line imaging modality.[4,10,11] However, access to neuroimaging facilities in Africa remains a major challenge, especially in rural and low-income areas such as Nigeria.[6] This has led to delayed diagnosis and treatment, which can worsen outcomes for patients with cerebrovascular disease. Many studies have been done all over the world to demonstrate the usefulness of CT brain in diagnosis and management of cerebrovascular accident.[4] However, in the study area there seem to be scanty literatures that have evaluated the role of CT brain in diagnosis and management of cerebrovascular accident. Therefore, this study was designed to evaluate the patterns of computed tomography imaging findings in patients diagnosed with cerebrovascular accident in Nigeria.

## METHOD

This cross-sectional retrospective study was conducted at the Radiology Department of University College Hospital (UCH) in South-western Nigeria using 320 radiological CT reports done from January 2023 to October 2023. Only CT radiological reports with CVA as imaging findings such as haemorrhagic(image1), infarcts(image

2) and transient ischemic attack (image 3) and those with complete patients' information such as age and gender were retrieved and used for this study. All CT brain reports with normal imaging finding and other pathological conditions that were not CVA, and reports with incomplete patients' data such as age and gender were excluded from the study. This study lasted for three months November, 2023 to January 2024. A purposive sampling method was used to select the CT radiological reports with CVA after obtaining approval of the study from the University College Hospital (UCH) Ibadan. Data such the types of CT images (haemorrhage, infacts and transient ischemic attacks) and demographic variables such as age and gender were retrieved, and recorded on data captured sheet. Obtained data were processed using Microsoft Excel version 2016 and Statistical Package for Social Sciences (SPSS) version 23.0. The results were presented using descriptive statistics in the form of tables, charts, frequency tables and percentages.

**Image 1.** An image showing axial view of CT image of the brain of a patient with haemorrhagic stroke (arrow)

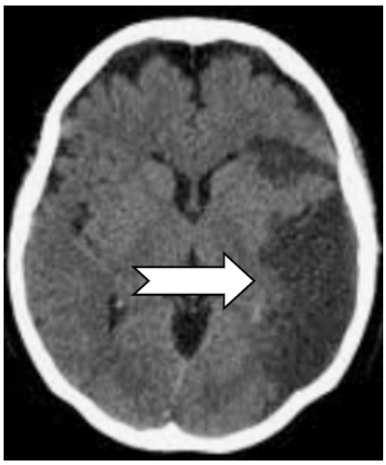

**Image 2.** An image showing axial view of CT image of the brain of a patient with infarct stroke(arrow)

**Image 3.** Axial view of CT image of the brain of a patient with transient ischemic stroke

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## RESULTS

The majority 208 (65 %) of the cases were that of males (figure 1). Out of 320 cases, most 104 (32,5 %) were within the age group of 60 -69 years, followed by age group 70 years and above 95 (29.7 %) and the least 20 (6,3 %) were cases within the age group less than 40 years old (figure 2).

Based in the frequency and percentage distributions of cases of CVA, out of 320 cases, the greater proportion 180 (56,3 %) had haemorrhage, followed by infarcts 120 (37,5 %) and the least 20 (6,3 %) was transient Ischemic attack (Figure 3).

With regards to age group and gender distributions of the CVA cases, out of 180 cases of haemorrhagic CVA, the greater number 80 (44,44 %) occurred among those of age group 60-69 years and the least 5 (2,78 %) were cases within age group >40 years of age. Out of 120 cases of infarcts, the majority 30 (25 %) of the cases were within age group 70 years and above of the 20 cases of transient Ischemic attack, the greater proportion 10 (50 %) of the cases were within the age group 50-59 years (Table 1).

The results on gender distributions of the CVA cases revealed that out of 180 cases of haemorrhagic CVA, the majority 110 (61,11 %) were males. Out of 20 cases of transient ischemic attacks, greater number 15 (75 %) were females (Table 2).

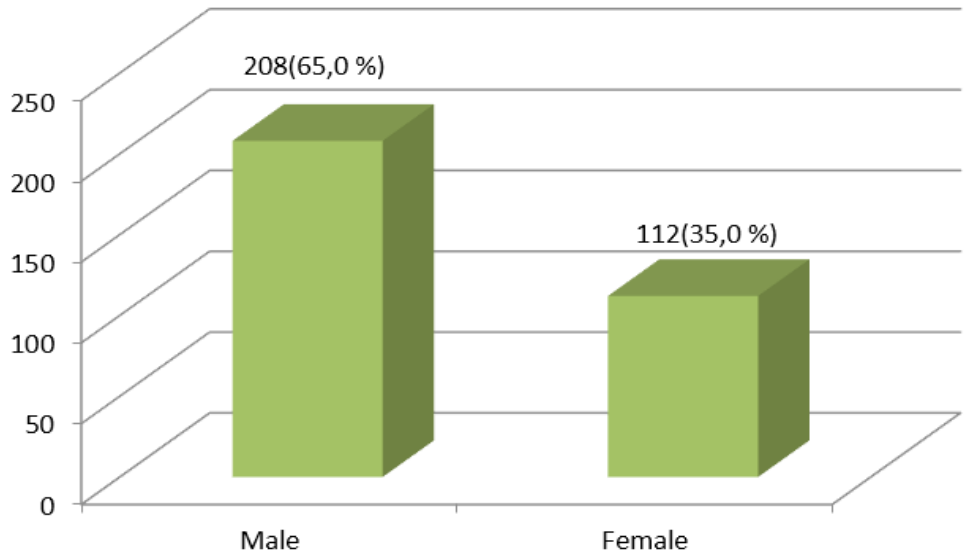


**Figure 1.** Chart showing frequency distribution of Gender

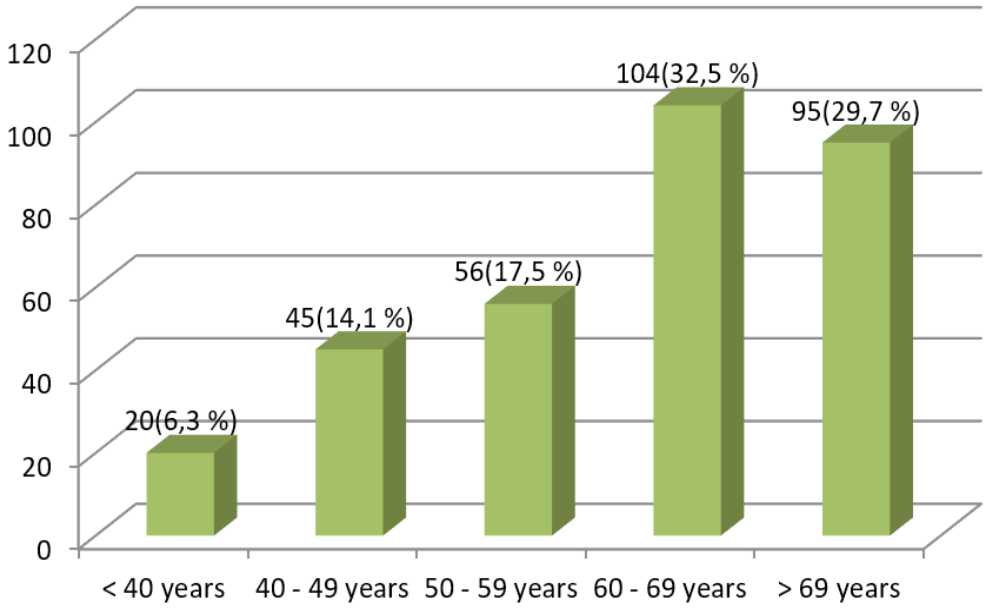


**Figure 2.** Chart showing frequency distribution of Age group

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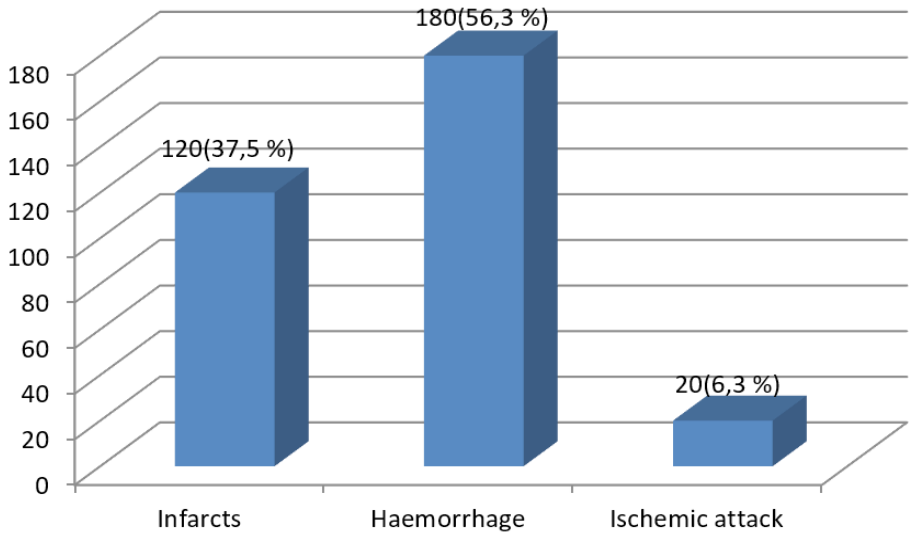


**Figure 1.** Chart showing frequency distributions of cerebrovascular accident cases

**Table 1.** Age group Distributions of CVA Cases

| Age group | Distributions of CVA Cases | | | |
|---|---|---|---|---|
| | Haemorrhage | Infarcts | Transient Ischemic Attack | Total |
| >40 years | 5 | 15 | | 20 (6,2 %) |
| 40- 49 | 10 | 30 | 5 | 45 (14,1 %) |
| 50- 59 | 20 | 26 | 10 | 56 (17,5 %) |
| 60- 69 | 80 | 19 | 5 | 104(32,5 %) |
| 70 and above | 65 | 30 | | 95(29,7 %) |
| Total | 180 (56,3 %) | 120 (37,5 %) | 20 (6,2 %) | 320 (100) |

**Table 2.** Gender distributions of the CVA cases

| Gender | Haemorrhage | Infarcts | Transient Ischemic Attack | Total |
|---|---|---|---|---|
| Male | 110 | 93 | 5 | 208 (65 %) |
| Female | 70 | 27 | 15 | 112 (35 %) |
| Total | 180 (56,3 %) | 120 (37,5 %) | 20 (6,2 %) | 320 (100 %) |

## DISCUSSION

The result of this study revealed that older adults from the 4th decades of life and above were commonly affected with CVA cases in the study population. This maybe so because older adults are prone to many risk factors of CVA such as hypertension, diabetes, and heart disease. In addition, as an individual get older, he/she may have less access to quality health care and may be less likely to seek medical attention especially in low-resource settings. The result of this study is in agreement with the findings of the studies conducted by Suman and Singh[1], Lokesh et al.[4], Sinha and Karim[12] and Holla *et al*[13] and which also reported the incidence of CVA to be more among the older adults from the 4th decades of life.

We found that majority of the CVA cases were in the male population when compared to their female counterparts. This could be attributed to the fact that males are more prone to factors that predisposes them to the causes of CVA than the females. This finding is consistent with the result reported in the study carried out by Lokesh *et al.*[4]. In Lokesh *et al.*[4] study, which was conducted to determine the role of CT in the evaluation of CVA at Hubli, India, reported that out of 100 cases of CVA, 52 (52 %) were males while females accounted for 48 (48 %).

In terms of the CVA type's distribution across the gender, haemorrhage was highest in the male population while infarcts and transient ischemic attacks were common among the female category. This means that the types of CVA occurred differently among different sexes. This findings is similar that reported by Suman and Singh.[1] and Lokesh *et al.*[4], which also reported differences in the occurrence of the various types CVA across the different sexes.

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The finding of this study revealed that haemorrhagic CVA was the most common of the types. This result is in agreement with the finding of the study conducted by Lokesh *et al*.[4] in India on the role of CT on the evaluation of CVA, which also reported haemorrhagic to be highest. Contrary to this finding, is the result documented by Suman and Singh.[1] in which they reported 57,5 % of infarcts against 32,5 % of haemorrhagic stroke. The differences in our findings could be ascribed to the different sample size used and the geographical variations of our studies.

## Conclusion

Male preponderance was noted in this study. Older adults were commonly affected and haemorrhagic CVA was the commonest CT imaging finding. Improving access to health care for males, and increasing screening and early detection of CVA, could also help to reduce the gender disparity.

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## CONFLICT OF INTEREST

None declared among the authors.

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