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Cerebrovascular Accident: The Disease Dilemma in Sub-Saharan Africa

Emmanuel James[1]*, Onoja Abigail[2], Ngbede Nelson Enenche[3] and Benson-Amangui Confidence[4]

[1]Department of Medicine and Surgery, University of Benin, Edo State, Nigeria

[2]Department of Biochemistry, University of Port Harcourt, River State, Nigeria

[3]Department of Chemistry, University of Agriculture, Markudi, Nigeria

[4]Department of Surgery, University of Benin, Edo State, Nigeria

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***Corresponding author:** Emmanuel James, Department of Medicine and Surgery, University of Benin, Benin City, Edo State, Nigeria, Email: emmanueljames4uniben@gmail.com

ABSTRACT

A stroke or Cerebrovascular Accident (CVA) is an urgent medical condition marked by an abrupt impairment of the cerebral vasculature or perfusion. The main cause of ischemic CVA is elevated blood pressure. Carotid dissection, coagulation issues and illegal drug use are major contributors in younger people. For CVA patients to have a better prognosis, they must receive an early diagnosis and effective treatment. With 15 million cases worldwide, Sub-Saharan Africa has the highest incidence rates, with up to 14 strokes per 1000 people. CVA causes 5.5 million deaths annually, with over 50% of survivors permanently incapacitated. The primary cause of high morbidity and mortality from CVA and other neurological disorders in developing nations is the lack of human resources. Neurologists, neurosurgeons and psychiatrists with advanced training are in short supply in developing countries. In addition, most stroke drugs, including tissue plasminogen activator (t-PA), are too costly for most patients and underdeveloped countries. The primary means of addressing the issue of the increasing number of CVAs is by implementing stroke prevention strategies, identifying individuals at increased risk and utilizing multidisciplinary stroke therapy. This approach, coupled with providing neuroimaging services and equipment to developing countries, can help curb these challenges.

Keywords: Cerebrovascular accident, Stroke, Cerebral, Neuroimaging

1. Introduction

A stroke, sometimes referred to as a cerebrovascular accident, is an urgent medical condition marked by an abrupt disruption of the cerebral vasculature or perfusion. Hypertension is the main cause of ischemic stroke; however, coagulation problems, carotid dissection and illegal drug use are also major causes of ischemic stroke in younger individuals[1]. An immediate diagnosis and prompt management are necessary to improve the prognosis of stroke patients. This activity examines the etiology, epidemiology, diagnosis and management of cerebrovascular disease as well as the challenges facing the diagnosis and management of the condition. Thus, to avoid or significantly reduce morbidity and mortality, it is imperative to identify and treat stroke early. During the acute phase, a quick history and examination were conducted. The saying "time is brain" makes it imperative not to waste any of it. Because acute stroke treatment is evolving rapidly, patients may require Intravenous

tissue Plasminogen Activator (IV tPA) for up to 4.5 hours or mechanical thrombectomy for up to six hours[1].

Stroke is linked to significant economic expenses and is a primary cause of disability, dementia and mortality globally. One stroke will occur in the lifespan of an average of one in four people worldwide[2]. This statistic is quite alarming, thus making it a common neurological problem. However, the availability of more acute stroke treatments and better inpatient care in high-income countries are likely the main reasons why age-standardized stroke death rates decreased significantly globally between 1990 and 2016. In contrast, the decrease in incidence was less severe in Africa[3].

In Africa, stroke was comparatively rare less than a century ago. However, in terms of Disability-Adjusted Life Years (DALYs) in northern, central, western, eastern and southern Africa, meningitis and migraine have ranked highest in recent systematic assessments conducted by investigators of the global burden of neurological diseases[4,5]. Africa currently has some of the highest global stroke burden indices[5]. Numerous causes spanning the lifespan are to blame for Africa's rising stroke burden. Significant contributing variables include dietary changes, population aging, increased exposure to indoor and outdoor particle air pollution and undernutrition during pregnancy and early life, which is associated with increased cardiometabolic risk factors in midlife[6].

Over the past ten years, stroke medicine in Africa has evolved; we now have a better grasp of population-attributable risk and the effect sizes of both established and new risk factors. African communities can now access more knowledge on the etiology of strokes as well as the pathophysiological types and subtypes of these diseases[6]. This includes a better comprehension of strokes brought on by HIV/AIDS infection and sickle cell illness[6].

Notwithstanding these developments, there are still a lot of unanswered questions regarding stroke in Africa as well as stroke treatment, practice and policy in the region. Establishing effective systems for stroke prevention, treatment and rehabilitation remains a challenge in many African countries[6].

2. Epidemiology

Strokes affect 15 million people annually worldwide; of these, 5 million die and another 5 million become permanently disabled, creating a burden on families and society. Strokes are rare in people under 40 and the main cause is typically excessive blood pressure. On the other hand, stroke occurs in 8% of children with sickle cell disease[7]. Due to up to 40% of stroke deaths happening within a month, up to 316 strokes per 100,000 people and a frequency of up to 14 strokes per 1000 people, Sub-Saharan Africa seems to have the highest age-standardized stroke incidence rates in the world[8]. With an age cutoff of fewer than 50 years, young people's strokes make up 10% to 14% of all ischemic strokes in high-income countries[9].

The first community-based research of stroke incidence in Africa was conducted in the southwest Nigerian city of Ibadan between 1973 and 1975, using data from the Ibadan Stroke Registry. It was stated that the annual crude incidence rate was 26 per 100,000 individuals[10]. Similar studies conducted in Lagos and Akure, Southwest Nigeria, in 2007 and 2010 found that the annual crude incidence rates were 25 per 100,000[11] and 61 per 100,000, respectively[12].

The findings of population-based studies indicate that stroke-related mortality is significant in Africa; estimates of the percentage of stroke-related fatalities to total deaths range from 5.5% to 11%[13]. In Agincourt, South Africa, research conducted from 1992 to 1995 assessed the crude stroke mortality rate for adults over the age of 35 to be 127 per 100,000; however, a 2016 study conducted at the same location showed a mortality rate of 114 per 100,000[14].

Using data from the GBD study, Sub-Saharan Africa saw the least reduction in stroke-associated disability-adjusted life years (DALYs) between 1990 and 2016[4]. 80% of all strokes, 77% of all stroke survivors, 87% of all stroke-related fatalities and 89% of all stroke-related Disability-Adjusted Living Years (DALYs) occur in LMICs (Table 1), including those in Africa, according to the same data[15].

Table 1: Studies of stroke incidence in selected African countries.

Country/region	Study period	Type of Study	Neuroimaging confirmation	Stroke subtype	Crude annual incidence rate	Ref
Incidence; annual range 25-260 per 100,000 from 1973 to 2013						
Nigeria, Ibadan	1973-1975	Community	No	Yes	26	10
Libya, Benghazi	1983-1984	Hospital	Yes	Yes	63	16
South Africa, Pretoria	1984-1985	Hospital	Yes	Yes	101	17
Egypt, Sohag	1992-1993	Community	Yes	Yes	180	18
Mozambique, Maputo	2005-2006	Hospital	Yes	Yes	149	19
Egypt, Al-Kharga	2005-2008	Community	Yes	No	260	12
Nigeria, Akure	2010-2011	Mixed	Yes	Yes	61	20

3. Implication of Stroke

3.1. To the individual

The effects of stroke are severe and typically affect more people than just the patient. The annual incidence of stroke is increasing in the general population, even if stroke-related deaths are declining. Acute stroke is often the beginning of a lifelong battle with physical damage and ensuing disability for many stroke survivors and their families[21]. Over time, several less well-known medical, musculoskeletal and behavioral issues exacerbate the initial clinical effects of stroke[21].

The repercussions of a stroke may include a range of problems associated with extended hospitalization and immobilization, as well as deteriorating neurological status due to hemorrhagic conversion or stroke extension. A multicenter study[22] found that the most frequent complications after the acute phase of stroke were recurrent strokes (9%), epileptic seizures (3%), urinary tract infections (24%), pneumonia (22%), pressure sores (21%), deep vein thrombosis (2%), pulmonary emboli (1%), depression (16%) and anxiety (14%).

3.2. To the family

Families may experience significant stress in the initial days and weeks following a stroke as they process the shock of what happened. Most families are left feeling uncertain about the diagnosis and what comes next because strokes typically happen quickly. When a couple shifts from a union that is based on mutual support to one that is focused on caregiving, intimacy may be lost and adult children may face particular challenges in juggling their personal and parental responsibilities[23].

Despite the fact that stroke's effects on family relationships have gotten less attention, research by Clark et al[24]. allows for certain conclusions to be drawn. Using a structured interview schedule, Clark et al[24]. discovered that 32% of families had inadequate family functioning and 66% of families had severe conflict. These findings indicate that there was significant family dysfunction in the first nine months following stroke. Similarly, 35% of caregivers in a population-based study of 84 families in Australia reported negative effects on family ties for a variety of reasons, such as miscommunication and the transfer of resentment regarding the stroke to other people.

3.3. Public health burden of stroke

With an estimated 5.5 million deaths per year, stroke is one of the most common causes of death globally[25]. The significant morbidity of stroke causes up to 50% of survivors to be permanently incapacitated, adding to the disease's burden in addition to its high mortality. Based on the most recent data available on the worldwide burden of illness related to stroke, there were 10.3 million new cases of stroke, 6.5 million fatalities, 113 million DALYs caused by stroke and approximately 25.7 million stroke survivors in 2013. Consequently, stroke is a condition that has major implications for both public health, the economy and society[26].

There are currently 4.85 million stroke deaths and 91.4 million Disability-Adjusted Life Years (DALYs) each year in developing countries, compared to 1.6 million deaths and 21.5 million DALYs in high-income countries, suggesting that the burden of stroke is shifting to these countries. In North Asia, the South Pacific, eastern Europe and central Africa, the stroke load is much higher. Because of ongoing demographic trends including population aging and changes in health care in these countries, the developing world is expected to have a much higher stroke rate in the ensuing decades[26].

According to a study conducted in Benin, the developing world bears the burden of the stroke epidemic; the most commonly reported stroke risk factor was hypertension (34.5%), while the most commonly reported stroke warning signals were paralysis and hemiplegia (34.4%). Similar claims have been made about Ghana and Nigeria's insufficient awareness of stroke risk factors and warning indicators (Figure 1). Nonetheless, 91.7% of university employees in Nigeria were able to identify hypertension, demonstrating their outstanding knowledge of stroke risk factors[27].

4. Challenges in the Diagnosis and Management of Stroke

The scarcity of resources in developing countries is the primary cause of the excess morbidity and mortality that arise from stroke and other neurological illnesses. The first in line is the human resource deficit. There is a shortage of highly qualified clinical neuroscience personnel in developing nations (neurologists, neurosurgeons and psychiatrists)[28].

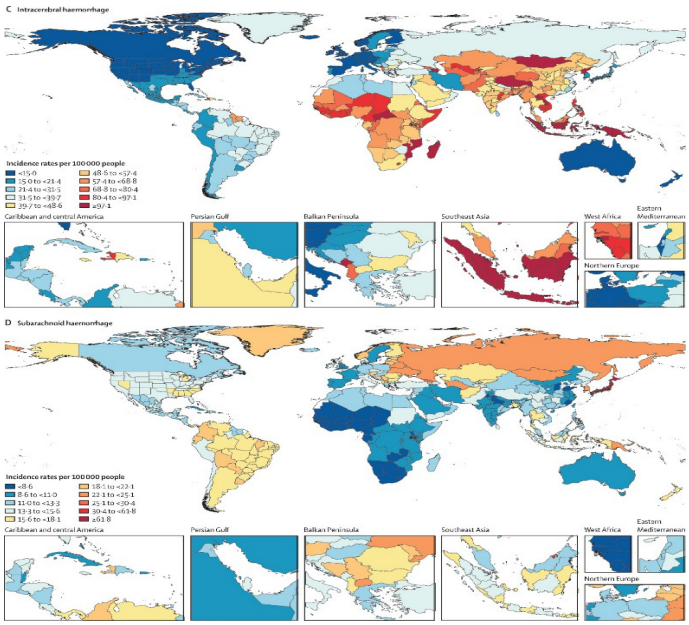

Figure 1: A map showing the global burden of stroke and images of the global, regional and national burdens of stroke and its risk factors from 1990-2019[3].

Another issue is the dearth of diagnostic resources (instrumentation). Advanced diagnostic tools such as cerebral angiography, ECG, CT scan, MRI and carotid duplex imaging are lacking. The two most crucial diagnostic methods are standard clinical examination and interviewing, which are used for indications of abnormal neurologic function. If these methods are not used correctly, the treatment plan may be affected. However, effective management and diagnosis frequently necessitate the use of diagnostic tools, which are typically found in clinics and hospitals with adequate equipment[26].

Furthermore, the majority of stroke medications, such as tissue plasminogen activator (t-PA), are too expensive for the majority of patients and developing nations. Other infrastructure, such as referral centers and systems for maintaining medical records, is extremely subpar in underdeveloped nations[28].

5. The Way Forward

Stroke prevention is the main strategy for tackling the problem of the rising number of strokes. The World Health Organization advises combining high-risk and population-wide efforts to prevent stroke and other cardiovascular diseases (CVDs). A crucial part of the high-risk prevention plan is figuring out the absolute risk of CVD over the next five or 10 years, since this helps identify people who are more likely to suffer acute CVD. Population-wide prevention techniques focus on a variety of lifestyle and behavioral risk factors. This approach is essential because the incidence of stroke and CVD in the general population can be considerably reduced with even modest changes in the distribution of risk factors. Other key stroke prevention strategies include community-based education initiatives and digital health technologies[29].

Acute treatment, rehabilitation, disease prevention and health promotion-the four stroke quadrant domains-face numerous challenges in the African stroke care system. Nevertheless, there are several workable solutions to these obstacles. First, regulations that direct regular examinations and risk factor identification should be put into place. By developing a framework for frequently monitoring and evaluating stroke (including burden and risk factors) and health services at the

national level, epidemiological surveillance can be improved. This paradigm might combine surveillance technology with community-based surveys. Second, implementing integrated individual and population-wide preventative methods may limit exposure to and enhance management of modifiable risk factors[6]. Third, acute stroke treatment can be enhanced by skillfully organizing its services, including staff development and capacity growth. Finally, expanding access to multidisciplinary care-including methods such as task sharing-can enhance poststroke rehabilitation offerings[6].

The use of neuroimaging will rise and in-hospital mortality will drop significantly as a result of multidisciplinary stroke care. In many African contexts, neuroimaging services (MRI or CT) are not readily available, reasonably priced or easily accessible, while being necessary for an accurate diagnosis of stroke. The supply of neurological institutes, personnel training and retraining and these services and equipment to developing nations will therefore aid in reducing some of these issues[9].

6. Future Implication

It is important to know that programs for public awareness are crucial. In the past, a patient's stroke was not officially diagnosed until at least 24 hours had passed. This results in patient apathy and prolonged inaction on the part of doctors. It is crucial to stress that defining stroke as a 24-hour period is no longer appropriate.

Research and further studies on this disease are essential and many populations generally have limited knowledge about stroke and stroke risk factors. More tests should be used for ongoing education and the general public's awareness in sub-Saharan Africa must be assessed. In specific populations, stroke registries should be established. This will provide a solid foundation for future statistical analysis and aid in defining the heterogeneity of stroke.

7. Conclusion

In conclusion, despite advancements in our understanding of several essential elements of this disease, including its epidemiology, quality of life and pathophysiology, stroke continues to be a condition of significant public health concern. Ischemic stroke is currently the most prevalent stroke subtype in both developed and developing nations. Hypertension remains the leading risk factor for stroke in both industrialized and developing countries, despite racial differences in stroke risk factors. In order to avoid stroke, it is essential to identify these risk factors. Preventing long-term incapacity requires timely treatment, sufficient diagnostic tools and human resources. Supporting patients with stroke consequences also requires the provision of rehabilitation services.

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