Dunya Journal of Medical Sciences (DJMS)
Volume 1, Issue No. 1, 2024

REVIEW ARTICLE

The State of Stroke in Somalia: Scoping Review

Mohamed Sheikh Hassan[1*]

[1]*Department of Neurology, Mogadishu Somalia Turkish Training and Research Hospital, Mogadishu, Somalia*

Received: May 02, 2024
Accepted: July 05, 2024
Published: July 15, 2024

Abstract:

***Background*:** Stroke is a leading cause of death and disability globally, with limited data available on its burden in Somalia. Stroke presents a significant public health concern in Somalia. This scoping review aims to map the existing literature on stroke including stroke, risk factors, prevalence, and challenges of stroke care in Somalia, identifying knowledge gaps and informing future research directions.

***Methods*:** A systematic search of electronic databases (*e.g.*, Google Scholar, PubMed, MEDLINE, Embase) was conducted using relevant keywords related to stroke and Somalia. Inclusion criteria encompassed studies reporting on stroke epidemiology, risk factors, presentations, diagnosis, treatment, or outcomes in a Somali population.

***Results*:** The review identified limited number of studies investigating stroke in Somalia. Almost all studies were conducted in single centers. There were no nationwide studies on stroke in the country. The majority of the studies focused on stroke prevalence, presentations, risk factors, and outcomes. Studies reported a high prevalence of stroke, with higher rates of hemorrhagic stroke compared to global average. The study identified major stroke risk factors included Hypertension, diabetes mellitus, hyperlipidemia, substance abuse, cardiac abnormalities, and previous stroke/TIA. Limited access to healthcare and delayed diagnosis were highlighted as significant challenges. Challenges of stroke care in Somalia is multifactorial including Limited access to healthcare, Scarcity of advanced imaging technique, and lack of public education about stroke symptoms and risk factors.

***Conclusion*:** This scoping review identified a limited body of research on stroke in Somalia. Existing studies suggest a significant stroke burden with unique characteristics. Further research is warranted to understand the specific epidemiology, risk factors, and optimal management strategies for stroke in the Somali context. This knowledge is crucial for developing targeted interventions and improving stroke care in Somalia.

Keywords: Stroke, Burden, Disability, Risk factors, Somalia.

1. INTRODUCTION

A stroke is a clinical condition characterized by rapidly emerging symptoms or signs of focal loss of cerebral function, with no other obvious cause than vascular origin. However, the loss of function can occasionally be extensive, such as in patients with subarachnoid hemorrhage and prolonged coma. Symptoms could be life-threatening or may persist for longer than 24 hours [1]. Stroke is a major global cause of death and disability, particularly among the elderly. Stroke is the second most common cause of death globally and the third leading cause of disability. It is a major contributor to dementia and depression [2]. Stroke occurs when there is a sudden death of some brain cells due to lack of oxygen, typically caused by a blocked or ruptured artery interrupting blood flow to the brain [3]. There are generally two types of strokes: ischemic strokes and hemorrhagic strokes. Ischemic strokes make up 85% of cases, while

**Correspondence should be addressed to Mohamed Sheikh Hassan, Mogadishu Somalia Turkish Training and Research Hospital, Mogadishu, Somalia; E-mail: dr.m.qalaf@gmail.com*

hemorrhagic strokes make up the remaining 15%. Ischemic strokes are further categorized into five types by the Trial of Acute Stroke Treatment (TOAST): 1) large-artery atherosclerosis, 2) cardioembolic, 3) small-vessel occlusion, 4) stroke of other determined etiology, and 5) stroke of unknown etiology. Hemorrhagic strokes are divided into two types: subarachnoid hemorrhage and intracerebral hemorrhage [4, 5]. Low and middle-income countries account for 70% of stroke cases, 87% of stroke-related deaths, and 90% of disability-adjusted life years worldwide [6]. In countries with high incomes, the incidence of stroke has decreased by 42% over the past few decades. On average, stroke leads to more deaths in low- and middle-income countries than in high-income countries, and it occurs 15 years earlier in these nations [7]. In recent decades, there has been a rise in stroke-related deaths and disability-adjusted life years (DALYs) (refer to Table **1**). Hemorrhagic strokes make up almost half of the global burden of stroke in terms of both mortality and DALYs, even though ischemic strokes are more common [8-10].

The rates of death and disability related to stroke are increasing in Africa, especially in sub-Saharan Africa, where the impact is higher compared to high-income countries. Africa experiences an annual stroke incidence rate of up to 316 per 100,000 people, which is one of the highest rates in the world. In their fourth or fifth decades of life, a significant number of Africans experience strokes, which have harmful effects on individuals, families, and society as a whole. Majority of stroke risk factors in Africa are modifiable. Hypertension is the most Common risk factor, but others include diabetes, heart diseases, physical inactivity, and substance abuse [11. 12].

Stroke is a significant public health issue in Somalia. Despite limited data, studies suggest it might be the second most prevalent cause of mortality, following ischemic heart disease. Interestingly, research studies indicate a higher prevalence of hemorrhagic stroke in Somalia compared to other countries (33.2% vs. a global average of 20%) [13]. The most common risk factors for stroke in Somalia are similar to other parts of Africa, with hypertension and diabetes topping the list. There's a scarcity of data on stroke in Somalia, making it difficult to get a complete picture of the situation.

This article reviews comprehensively the current state of stroke in Somalia, including its prevalence, risk factors, stroke types, and challenges in stroke management in Somalia.

2. RISK FACTORS FOR STROKE IN SOMALIA

Identifying specific risk factors for stroke in Somalia is challenging due to limited epidemiological data and healthcare infrastructure. However, based on broader trends in sub-Saharan Africa and considering Somalia's socio-economic con-

Table 1. Absolute number of DALYs, deaths, incident, and prevalent cases of ischemic and hemorrhagic stroke (with 95% uncertainty intervals [UIs]) in the world in 1990 and 20135.

Parameter	1990	2013
Ischemic stroke		
Deaths	2,182,865 (1,923,290–2,430,872)	3,272,924 (2,812,654–3,592,562)
Incidence	4,309,356 (4,118,103–4,531,909)	6,892,857 (6,549,814–7,352,226)
Prevalence	10,045,202 (9,643,525–10,453,439)	18,305,491 (17,767,372–18,920,736)
DALYs	34,155,606 (29,592,196–38,325,866)	47,424,681 (40,537,540–52,211,800)
Hemorrhagic stroke		
Deaths	2,401,930.40 (2,109,380.2–2,669,117.5)	3,173,951 (2,885,717–3,719,684)
Incidence	1,886,345 (1,816,991–1,976,659)	3,366,175 (3,199,978–3,543,213)
Prevalence	3,891,158 (3,769,541–4,019,014)	7,363,457 (7,139,691–7,616,146)
DALYs	55,953,376 (49,881,127–62,161,971)	65,454,194 (59,497,415–74,654,738)

Abbreviation: DALYs, disability-adjusted life-years.
Note: Data from Feigin *et al.* Neuroepidemiology. 2015;45(3):161–176. doi:10.1159/000441085

text, the most common risk factors for stroke in Somalia are similar to other parts of Africa. In a study conducted by Sidow No *et al.* [13], diabetes was found to be the cause of 80.4% of ischemic stroke cases, with hypertension accounting for 61.4% of cases. Conversely, high blood pressure was the leading risk factor for hemorrhagic stroke, accounting for 38.6% of cases, followed by diabetes mellitus, which accounted for 19.6% of cases. According to another study by MS Hassan *et al.,* hypertension was the most common risk factor among patients 121(57%), followed by hyperlipidemia 73(34%), diabetes 65(31%) mellitus, heart disease 9(4.2%), and previous stroke/TIA 16(7.5%) [14]. Despite limited data, the available literature shows that hypertension, diabetes, hyperlipidemia, substance abuse, prior history of stroke/TIA, and heart disease are the most common risk factors in Somalia, respectively. Cardiovascular abnormalities are a major factor in stroke-related deaths, particularly in people who have experienced acute ischemic stroke. In acute ischemic stroke, cardiac abnormalities can lead to a stroke through an embolic event. Ischemic stroke is primarily caused by a thrombotic or embolic event, with emboli often originating from the heart. To improve the prognosis of patients following acute ischemic stroke and reduce their chance of developing CVD in the future, it is therapeutically necessary to identify and treat risk factors for future CVD early on [15-18]. According to MS Hassan *et al.* [19], study, a higher percentage of cardiac anomalies was found in patients with ischemic stroke who were hospitalized at a multidisciplinary hospital in Somalia. In order to fully comprehend the distinct stroke risk factors in Somalia, additional research is necessary. Targeted preventive measures can be implemented once the stroke risk factors are identified.

3. STROKE TYPES AND PRESENTATIONS IN SOMALIA

There is a lack of comprehensive data on the types and presentations of strokes in Somalia due to insufficient study on the subject. According to a study, in a tertiary care hospital in Somalia, the prevalence of ischemic strokes was66.8% while hemorrhagic strokes was 33.2% [13]. According to this study, Somalia has a greater incidence of hemorrhagic stroke (33.2% vs. 20%) than the global average. The most common ischemic stroke subtype, as identified in the Trial of Org 10172 in Acute Stroke Treatment (TOAST) classification, was ischemic stroke of other identified etiology (28.7%), followed by indeterminate (24.6%) and large artery atherosclerosis (22.1%). Meanwhile, cardioembolic stroke (13.3%) and lacunar stroke (11.3%) were the ischemic stroke subtypes with the lowest frequency. In the emergency department, strokes (or cerebrovascular accidents) can present with various signs and symptoms, depending on the type and location of the stroke. Major presentations are hemiplegia/paresis, conscious impairment, disorientation, dysphagia, aphasia/dysarthria, paresthesia, and sudden headache [20-23]. In one Study in Somalia, the major stroke presentations in the emergency was altered mental status 141 (44%), motor weakness (hemiplegia), 102 (31.8%), seizures 33 (10%), headache 17 (5.3%), vertigo 9 (2.8%), speech impairment 8 (2.5%), acute vision loss 5 (1.6%), involuntary movement 4 (1.2%), and gait impairmentn1 (0.3%) [23, 24].

4. STROKE RELATED MORBIDITY AND MORTALITY IN SOMALIA

Stroke is a leading cause of death and disability worldwide, and Somalia faces a particularly significant burden. Compared to high-income countries, stroke strikes Somalis at a younger age, causing devastating consequences for individuals, families, and the healthcare system. The exact prevalence is unknown due to limited data, but it's a major public health concern. The major risk factors for stroke in Somalia mirror those seen globally. Hypertension is the leading culprit, with a high prevalence among stroke patients in Somalia. Diabetes Mellitus is another major risk factor, with a strong association with stroke in Somalia. Other potential contributors include hyperlipidemia, smoking, unhealthy diet, and physical inactivity. Strokes affecting young patients in Somalia is striking problem since it has more profound impact. The loss of productivity and the burden placed on families are more severe compared to strokes in older individuals. According recently published study, the Major causes of hemorrhagic stroke in young adults in Somalia are hypertension cerebral venous thrombosis, substance abuse, arteriovenous malformation, cavernoma, eclampsia, and cryptogenic [28]. In this study, intrahospital mortality was 28% in patients with hemorrhagic strokes. Hematoma volume greater than 30 mL, thrombolytic etiology, brainstem ICH location, substance abuse related

etiology, presence of associated mass effect, low GCS score at admission, high systolic blood pressure at admission, and chronic renal failure were the factors that predicted intrahospital mortality. According to a study by MS Hassan *et al.,* stroke-related mortality in Somalia is a significant public health concern. This is exacerbated by healthcare system limitations, barriers to accessing care, prevalent risk factors, and the impact of humanitarian crises. Data from single-center studies are the only ones that provide information on stroke morbidity and mortality. Most of these studies assess in-hospital deaths, and national research on stroke-related mortality has not been published. In Somalia, the burden of stroke is significant, influenced by various factors including healthcare infrastructure challenges, limited access to medical services, and socioeconomic conditions.

5. CHALLENGES OF STROKE CARE IN SOMALIA

Stroke care in Somalia faces major setbacks due to the country's persistent political instability, inadequate healthcare infrastructure, and resource constraints. Decades of conflict have severely disrupted Somalia's healthcare system, resulting in adequate skilled healthcare professionals, a lack of medical supplies and equipment, and shortage of funding for healthcare services. There are limited hospitals that provide appropriate management for patients with acute stroke.

Currently, there are no established dedicated stroke units in the country. There is no mechanical thrombectomy available for patients with acute ischemic stroke throughout the country. Only certain hospitals or facilities are able to provide intravenous thrombolytic therapy to patients who have had an acute ischemic stroke. The availability of surgical treatment for stroke patients, when indicated, is also challenging due to insufficient of resources and shortage of skilled professionals. Stroke management recommendations/guidelines are only applicable in a limited number of hospitals. The emergency ambulance service is not effective, and patients must rely on alternative modes of transportation to reach to the hospitals. Additionally, the emergency medical services are not developed, which may contribute to prehospital delays. Each of these difficulties significantly harms the outcome of stroke care in the country.

The level of care provided during an acute stroke is a crucial determinant of the patient's outcome. The quality of care significantly affects the outcomes for these patients. For example, prompt initiation of appropriate treatment relies on early diagnosis and rapid identification of stroke symptoms. Timely treatment is vital for reducing the extent of brain damage and improving outcomes. Availability of specialized stroke units are important. These units provide intensive monitoring and standardized care from multidisciplinary teams, including neurologists, neurosurgeons, and rehabilitation specialists. In some cases, surgical treatments such as evacuation of hematoma or placement of a ventricular drain may be necessary. The availability of skilled neurosurgeons and access to surgical facilities are critical for determining the quality of care and subsequent outcomes, which are currently inadequate in Somalia. Additionally, post-acute care and rehabilitation plays a crucial role in assisting patients recover from the disability. Long-term results are impacted by the quality of rehabilitation treatments, such as speech, occupational, and physical therapy [25-27]. Physical rehabilitation after stroke in Somalia faces significant challenges related to healthcare infrastructure, resources, and access.

6. INITIATIVES TO IMPROVE STROKE CARE IN SOMALIA-THE WAY FORWARD

Somalia faces a specific situation regarding stroke compared to other parts of the world. Stroke is a leading cause of death and disability worldwide, and Somalia faces a particularly significant burden. Improving stroke care in Somalia requires a multifaceted approach that focuses on prevention, early diagnosis and treatment, capacity building, and addressing specific challenges. By implementing these strategies and fostering collaboration, Somalia can significantly reduce the burden of stroke and improve the lives of its citizens. This fight requires dedication from the government, healthcare professionals, and the Somali public, but the potential to save lives and improve well-being makes it a worthwhile endeavor.

Special attention should be given to public awareness campaigns because educating the public about stroke symptoms and risk factors is crucial. This empowers people to seek timely medical attention and potentially avoid strokes altogether.

Improving access to healthcare is particular important. This should particularly focus on expanding healthcare facilities, this allows for earlier diagnosis and treatment. Equipping hospitals with CT scanners for rapid stroke diagnosis is essential. While MRI scans might be ideal, their initial cost and ongoing maintenance might be prohibitive.

Training doctors to diagnose stroke, administer appropriate medications (*e.g.* thrombolytic treatment/mechanical thrombectomy or stroke surgical management), and manage complications is crucial. Developing stroke units within hospitals can provide concentrated expertise and resources for stroke patients. These units would ideally have dedicated staff trained in stroke management protocols. By implementing these strategies and fostering collaboration, the burden of stroke can be reduced significantly. All these require dedication from the government, healthcare professionals, and the Somali public, but the potential to save lives and improve well-being makes it a worthwhile endeavor.

CONCLUSION

The review article summarizes existing literature on stroke in Somalia and identify areas where stroke related data is scarce. This could help healthcare professionals and policymakers develop better strategies for preventing, diagnosing, and treating stroke in the country. More research is needed to understand the specific causes and improve preventative measures and treatment options.

AUTHORS' CONTRIBUTIONS

The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

CONSENT FOR PUBLICATION

Not applicable.

FUNDING

None.

CONFLICT OF INTEREST

The author confirms that this article's content has no conflict of interest.

ACKNOWLEDGEMENTS

Declared none.

REFERENCES

[1] Feigin VL, Lawes CM, Bennett DA, Barker-Collo SL, Parag V. Worldwide stroke incidence and early case fatality reported in 56 population-based studies: a systematic review. The Lancet Neurology. 2009 Apr 1;8(4):355-69.

[2] Thrift AG, Howard G, Cadilhac DA, Howard VJ, Rothwell PM, Thayabaranathan T, Feigin VL, Norrving B, Donnan GA. Global stroke statistics: An update of mortality data from countries using a broad code of "cerebrovascular diseases". International Journal of Stroke. 2017 Oct;12(8):796-801.

[3] Ovbiagele B, Nguyen-Huynh MN. Stroke epidemiology: advancing our understanding of disease mechanism and therapy. Neurotherapeutics. 2011 Jul 1;8(3):319-29.

[4] Adams Jr HP, Bendixen BH, Kappelle LJ, Biller J, Love BB, Gordon DL, Marsh 3rd EE. Classification of subtype of acute ischemic stroke. Definitions for use in a multicenter clinical trial. TOAST. Trial of Org 10172 in Acute Stroke Treatment. stroke. 1993 Jan;24(1):35-41.

[5] Sheikh Hassan M, Mohamed Ali A, Farah Osman M, Ahmed A. Spontaneous bilateral basal Ganglia hemorrhage due to severe hypertension. Vascular Health and Risk Management. 2022 Jul 6:473-7.

[6] Feigin VL, Brainin M, Norrving B, Martins S, Sacco RL, Hacke W, Fisher M, Pandian J, Lindsay P. World Stroke Organization (WSO): global stroke fact sheet 2022. International Journal of Stroke. 2022 Jan;17(1):18-29.

[7] Thrift AG, Cadilhac DA, Thayabaranathan T, Howard G, Howard VJ, Rothwell PM, Donnan GA. Global stroke statistics. International Journal of stroke. 2014 Jan;9(1):6-18.

[8] Feigin VL. Stroke in developing countries: can the epidemic be stopped and outcomes improved?. The Lancet Neurology. 2007 Feb 1;6(2):94-7.

[9] Krishnamurthi RV, Moran AE, Feigin VL, Barker-Collo S, Norrving B, Mensah GA, Taylor S, Naghavi M, Forouzanfar MH, Nguyen G, Johnson CO. Stroke prevalence, mortality and disability-adjusted life years in adults aged 20-64 years in 1990-2013: data from the global burden of disease 2013 study. Neuroepidemiology. 2015 Oct 28;45(3):190-202.

[10] Pu L, Wang L, Zhang R, Zhao T, Jiang Y, Han L. Projected global trends in ischemic stroke incidence, deaths and disability-adjusted life years from 2020 to 2030. Stroke. 2023 May;54(5):1330-9.

[11] Akinyemi RO, Ovbiagele B, Adeniji OA, Sarfo FS, Abd-Allah F, Adoukonou T, Ogah OS, Naidoo P, Damasceno A, Walker RW, Ogunniyi A. Stroke in Africa: profile, progress, prospects and priorities. Nature Reviews Neurology. 2021 Oct;17(10):634-56.

[12] Owolabi M, Olowoyo P, Popoola F, Lackland D, Jenkins C, Arulogun O, Akinyemi R, Akinyemi O, Akpa O, Olaniyan O, Uvere E. The epidemiology of stroke in Africa: a systematic review of existing methods and new approaches. The Journal of Clinical Hypertension. 2018 Jan;20(1):47-55.

[13] Sidow NO, Kög N, Hassan MS, Mohamud MH. Estimated Burden and Risk Factors of Ischemic and Hemorrhagic Strokes in a Tertiary Hospital, Mogadishu-Somalia: A Cross-Sectional Study. Somalia Turkiye Medical Journal (STMJ). 2023 Jul 15;2(3):1-8.

[14] Sheikh Hassan M, Yucel Y. Factors influencing early hospital arrival of patients with acute ischemic stroke, cross-sectional study at teaching hospital in Mogadishu Somalia. Journal of Multidisciplinary Healthcare. 2022 Dec 31:2891-9.

[15] Ahmed SA, Karataş M, Öcal L, Hassan MS, Mohamud MA, Hassan MO, Dirie AM, Waberi MM, Ali AA. Isolated left ventricular non-compaction cardiomyopathy complicated by acute ischemic stroke: A rare case repor. Annals of Medicine and Surgery. 2022 Sep 1;81.

[16] Kim Y, Lee SH. Embolic stroke and after-admission atrial fibrillation. *Int J Cardiol*. 2016;222:576–580. doi:10.1016/j.ijcard.2016.07.265

[17] Kim M, Kim HL, Park KT, Kim YN, Lim JS, Lim WH, Seo JB, Kim SH, Kim MA, Zo JH. Echocardiographic parameters determining cardiovascular outcomes in patients after acute ischemic stroke. The International Journal of Cardiovascular Imaging. 2020 Aug;36:1445-54.

[18] Bogousslavsky J, Kaste M, Skyhoj Olsen T, Hacke W, Orgogozo JM. Risk factors and stroke prevention. Cerebrovascular Diseases. 2000 Jul 1;10(Suppl. 3):12-21.

[19] Hassan MS, Mire Waberi M, Osman Sidow N, Hassan MO, Akyüz H, Ahmed Abdi I, Bashir AM, Abdirahman Ahmed S. Analysis of Echocardiographic Findings of Patients with Acute Ischemic Stroke Admitted to a Tertiary Care Hospital in Mogadishu, Somalia. International Journal of General Medicine. 2023 Dec 31:2887-95.

[20] Bhaskar S, Thomas P, Cheng Q, Clement N, McDougall A, Hodgkinson S, Cordato D. Trends in acute stroke presentations to an emergency department: implications for specific communities in accessing acute stroke care services. Postgraduate Medical Journal. 2019 May;95(1123):258-64.

[21] Newman-Toker DE, Moy E, Valente E, Coffey R, Hines AL. Missed diagnosis of stroke in the emergency department: a cross-sectional analysis of a large population-based sample. Diagnosis. 2014 Jun 1;1(2):155-66.

[22] Morotti A, Poli L, Costa P. Acute stroke. In Seminars in neurology 2019 Feb (Vol. 39, No. 01, pp. 061-072). Thieme Medical Publishers.

[23] Hassan MS, Sidow NO, Gökgül A, Adam BA, Osman MF, Mohamed HH, Ibrahim IG, Abdi IA. Pattern of neurological disorders among patients evaluated in the emergency department; cross–sectional study. Archives of Academic Emergency Medicine. 2023;11(1).

[24] Hassan MS, Sidow NO, Adam BA, Gökgül A, Ahmed FH, Ali IH. Epidemiology and risk factors of convulsive status epilepticus patients admitted in the emergency department of tertiary hospital in Mogadishu, Somalia. International Journal of General Medicine. 2022;15:8567.

[25] Deutsch A, Granger CV, Heinemann AW, Fiedler RC, DeJong G, Kane RL, Ottenbacher KJ, Naughton JP, Trevisan M. Poststroke rehabilitation: outcomes and reimbursement of inpatient rehabilitation facilities and subacute rehabilitation programs. Stroke. 2006 Jun 1;37(6):1477-82.

[26] Olaleye OA, Hamzat TK, Owolabi MO. Stroke rehabilitation: should physiotherapy intervention be provided at a primary health care centre or the patients' place of domicile?. Disability and rehabilitation. 2014 Jan 1;36(1):49-54.

[27] Stinear CM, Lang CE, Zeiler S, Byblow WD. Advances and challenges in stroke rehabilitation. The Lancet Neurology. 2020 Apr 1;19(4):348-60.

[28] Hassan MS, Bakir A, Sidow NO, Erkok U, Ahmed SA, Abshir MD, Köksal AA. Etiology, Risk Factors and Outcome of Spontaneous Intracerebral Hemorrhage in Young Adults Admitted to Tertiary Care Hospital in Mogadishu, Somalia. International Journal of General Medicine. 2024 Jun 25;17:2865-75.