



Epilepsy in Africa: a multifaceted perspective on diagnosis, treatment, and community support

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Abstract

Epilepsy is the most widespread neurological disorder in Africa, affecting an estimated 25 million people. The disorder is characterized by recurrent seizures, which can be caused by a variety of factors, including past trauma, central nervous system infections, and genetic disorders. Diagnosis and treatment of epilepsy are challenging in African patients due to several factors, including the low socioeconomic status of the residents and limited access to appropriate medication. Phenobarbital remains the only drug widely available to patients, but it is not always effective and can have significant side effects. In addition to the medical challenges, individuals with epilepsy also face a lot of social stigmas in Africa. Widespread superstitions and false beliefs lead to prejudices against these people, making it difficult for them to live fulfilling social lives. With the development of new treatment modalities, such as gene therapy, stem cell therapy, and P-glycoprotein inhibitors, it is more important now than ever to increase the research output for the African region to create the best possible treatment and maximize patient outcomes.

Keywords: africa, epilepsy treatment, epilepsy, low- and middle-income countries, stigma, treatment development

Introduction

Epilepsy is a neuropsychiatry disease characterized by recurrent seizures. It is the most common neurological disorder in Africa, caused by an abnormal, excessive, purposeless, and synchronized electrical discharge in the brain cells called neurons^[1,2]. It can vary from brief and nearly undetectable periods to long periods of vigorous shaking due to abnormal electrical activity in the brain^[1]. These episodes can result in injuries, either directly such as broken bones, or through causing accidents^[1]. Epilepsy is a frequent chronic neurologic disorder that affects ~50 million people of all ages^[3]. About 80% of people with epilepsy are found in developing

countries, where it is a major public health problem, not because of its health implications alone but also for its social, cultural, psychological, and economic connotations^[1]. It is also important to note that about 60% of patients with Epilepsy receive no anti-epileptic treatment^[4].

About 25 million people have been reported to have epilepsy in Africa, and the majority of these people do not receive appropriate care^[5]. The disease is further worsened in the region by shortages of trained health workers, limited diagnostic and treatment equipment, sociocultural beliefs, and people who are suffering from Epilepsy are grossly discriminated against, it is believed that the stigma associated with the disease kills even faster than the disease itself^[6]. Studying epilepsy in Africa reinforces our understanding of the disease, encourages health interventions, and promotes healthcare in the region.

Obtaining data regarding the occurrence and outlook of epilepsy in Sub-Saharan Africa presents challenges, yet epidemiological estimates derived from comprehensive door-to-door surveys indicate a prevalence nearly twice as high as that reported in Asia, Europe, and North America^[4]. The prevalence of Epilepsy varies between developed and developing countries with prevalence figures between 4 and 7 people with epilepsy per 1000 persons in the developed countries^[7] and between 5 and 74 people with epilepsy per 1000 persons in developing countries^[8]. Epilepsy is more prevalent in developing countries than in the industrialized world^[9]. Compared to Asia, the median prevalence of epilepsy in Sub-Saharan Africa and Latin America is 15.0 and 17.8 / 1000, respectively. In Asia, it is about 6/1000, similar to the prevalence observed in Europe and North America^[10].

The purpose of this paper is to make commentaries and share our perspective on Epilepsy in Africa.

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Risk factors, diagnosis, and management of epilepsy in Africa

The causes of epilepsy are divided into the following categories: structural, genetic, infectious, metabolic, immune, and unknown. In sub-Saharan Africa, neonatal trauma, head injuries, past febrile seizures, family history of seizures, and central nervous system (CNS) infections such as bacterial meningitis, encephalitis, and neurocysticercosis are the major risk factors for epilepsy.^[4] Through inadequate nutrition, poor sanitation, an increase in insects and rodents, and a lack of access to medical treatment, poverty, and illiteracy promote infectious CNS diseases^[11]. Researches indicate more than 90% of those who have epilepsy are under the age of 20 in less developed nations, particularly in sub-Saharan Africa^[12,13].

Epileptic and non-epileptic seizures are almost always diagnosed solely based on clinical history, which should be skillfully gathered and frequently necessitates comprehensive questioning of the patient and witnesses (Fig. 1). Sometimes the diagnosis can be made simply by looking at the clinical history; other times, video records of the incidents must be requested. Video electroencephalogram (EEG) documentation is required in more complex instances^[14]. Several investigations including computed tomography scan, magnetic resonance imaging, positron emission tomography, single photon emission computed tomography, and genetic testing help to confirm the diagnosis^[15].

People with epilepsy in Africa face major obstacles due to socioeconomic issues such as poverty and a lack of access to healthcare. Epilepsy diagnostic resources and treatments can be difficult to obtain for those who are poor because they cannot afford to travel to medical institutions or take time out of work to receive treatment. The shortage of trained specialists and a burdened health delivery system further complicate the challenge^[16].

The only anti-epileptic drug that is often prescribed in most nations is phenobarbital. Although these are frequently available,

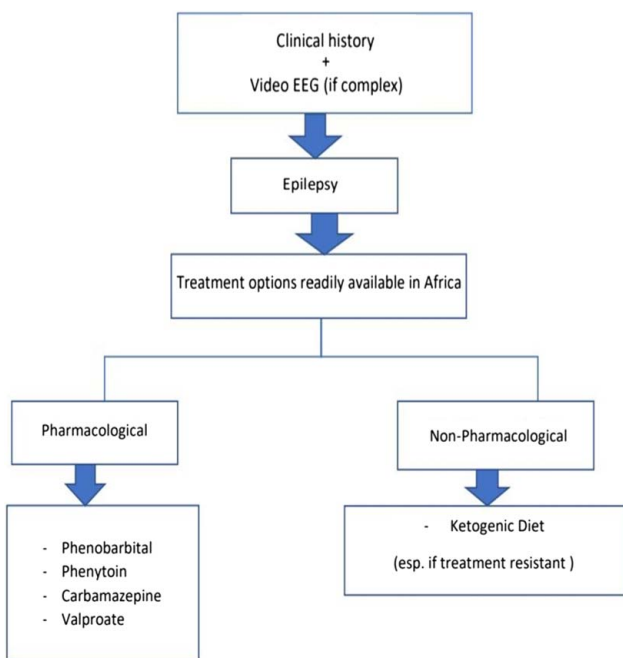


Figure 1. Diagnosis and management options of epilepsy in Africa.

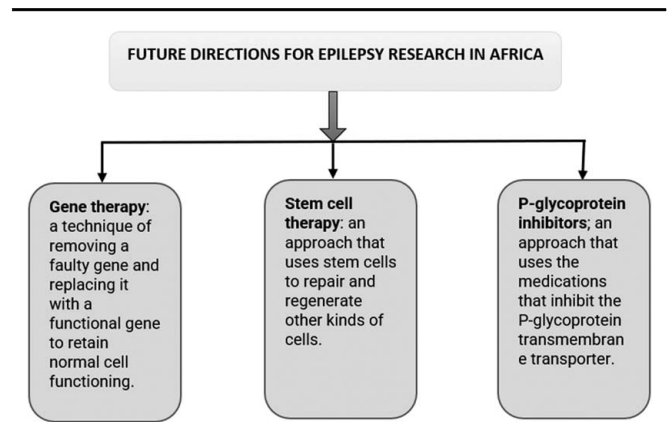


Figure 2. Flowchart indicating the future directions for epilepsy research in Africa.

other typical epilepsy medications including phenytoin, carbamazepine, and valproate are substantially more expensive^[17]. Effectiveness of phenobarbital in most forms of epilepsy and its low cost made it the most prescribed anti-epileptic medication in Africa^[4]. Phenobarbital, however, is not always in stock in most pharmacies in Africa. Only a fifth of pharmacies in Zambia that were surveyed had phenobarbital on hand, and nearly half did not carry any anti-epileptic medications at all^[18].

Phenobarbital may still be out of reach for certain people in the world’s poorest nations despite its modest price. Patients frequently have trouble adhering to treatment regimens because they do not always understand why they must take a daily prescription for an intermittent disease. Aside from drug interactions, there are also worries about medication toxicity^[19].

Comparative studies have shown that newer anti-epileptic drugs, when used as first-line therapy, have similar efficacy and fewer side effects than the older ones. Included in the newer list are lamotrigine, oxcarbazepine, levetiracetam, topiramate, zonisamide, and lacosamide^[20]. However, these drugs are not available in most African countries due to mainly cost.

The ketogenic diet, which consists of a low carbohydrate, high fat, and moderate protein intake, is a popular therapeutic choice for drug-resistant epilepsy in children and is used extensively in the majority of specialized paediatric epileptic centres worldwide^[21]. This type of diet has shown promising results in research done in Zambia among paediatric drug-resistant epileptic patients^[22]. Because of cost, a shortage of neurosurgeons, and a lack of infrastructure to support advanced technologies, most of sub-Saharan Africa does not have access to epilepsy surgery such as resection surgery, deep brain stimulation, corpus callosotomy, hemispherectomy, or other less invasive techniques^[23].

Epilepsy’s cultural and social impacts in africa.

Epilepsy has significant cultural and social impacts in Africa. Due to superstitions and cultural beliefs, epilepsy is often stigmatized and misunderstood in many African communities^[24]. People with epilepsy are seen as possessed by evil spirits or witches, which can lead to discrimination and exclusion from society^[25]. This stigma can also prevent individuals with epilepsy from seeking appropriate medical treatment, leading to further health complications^[26].

Frequent epileptic seizures being the most challenging hurdle that people with epilepsy encounter, make these people unemployed, divorced, marginalized, isolated, and celibate^[27]. Not only that but also low self-esteem, overprotective parents, decreased school attendance, and lack of academic ambition cause people with epilepsy to struggle academically^[28]. All these hurdles or obstacles met by these people with epilepsy bring about low quality of life.

It is necessary to implement a variety of strategies to increase awareness and lessen the stigma surrounding epilepsy. These include educating those who have the condition and their families, participating people with epilepsy and their families in clinical research studies and surveys, and forming partnerships with the entertainment industry to ensure that accurate information about epilepsy is spread^[29]. Implementing these strategies will lessen the stigma associated with epilepsy, help people with epilepsy and their families cope with the condition and its effects, and promote inclusivity of these people in society because they will be able to fully participate and play their part.

Future directions for epilepsy research in Africa

The persistence of epilepsy in patients irrespective of the availability of medications remains the bottleneck in the fight against epilepsy that imposes a remarkable strain in multimorbidity and escalated possibilities of early death.^[30] More than 30% of people with epilepsy show a negative response to anti-seizure medications that are commonly used to diminish the effects of epilepsy on the patient and this calls for novel therapies and interventions to alleviate the disorder manifestations and their standards of living^[30,31]. The novel therapies and interventions include gene therapy, stem cell therapy, and P-glycoprotein inhibitors to mention a few^[31].

Gene therapy is a technique of removing a faulty gene and replacing it with a functional gene to retain normal cell functioning (Fig. 2)^[32]. Although this technique is promising in epilepsy treatment, it can only be used on focal and specific temporal lobe epilepsies as they are the best types of epilepsy for this technique whose purpose is to prevent anticonvulsant and antiepileptogenic effects thus occluding the development of the disorder^[32].

Stem cells are unspecialized cells that can differentiate into other cells; for this reason, they can be useful in the repair and regeneration of other cells^[33]. Stem cell therapy also stands as a promising approach to epilepsy treatment since it can be used to replenish faulty cells or dead cells of the brain hence rectifying the disparity of excitatory and inhibitory electrical activities of the brain^[33].

P-glycoprotein inhibitors are medications that inhibit the functioning of P-glycoprotein. P-glycoprotein is a transmembrane protein transporter of the Adenosine triphosphate binding cassette family that is found in many tissues including those of the blood-brain barrier that functions to pump xenobiotics and other toxic substances outside of the cell^[34]. Overexpression or upregulation of p-glycoprotein in the central nervous system stands as the reason for drug resistance in epilepsy patients^[35-37]. Using inhibiting drugs such as verapamil and phenytoin to inhibit p-glycoprotein serves as a promising approach in combating the adverse effects of epilepsy^[35,37].

The lack of data and guidance concerning the environmental factors contributing to epilepsy, such as nutritional issues and preventable parasitic infections, alongside the unexplored areas of metabolic, genetic, structural, and immunological aspects of epilepsy, as well as perinatal factors linked to epilepsy, underscore the need for additional research. These are all critical

research gaps that require further investigation in the context of epilepsy research in Africa^[4,38-40].

Collaboration between African and international institutions is required to enhance epilepsy research in Africa because of the discrepancy in the quality and quantity of neuroscience research between Africa and other industrialized nations. African neuroscientists were able to acquire the best training in the neuroscience area because of the partnership with international organizations like the International Brain Research Organization (IBRO), which has been of tremendous relevance. In addition, through these partnerships, several non-profit organizations, like Teaching And Research In Natural Sciences For Development (TReND) in Africa, provide the necessary research equipment^[40]. It is obvious that cooperation between African and international institutions is crucial for developing neuroscience research in Africa, including research on epilepsy^[41].

Conclusion and recommendations

In addressing epilepsy in Africa, there's a pressing need to boost research output due to the substantial lack of information about its causes and mechanisms. Africa faces a high prevalence of risk factors like head trauma, prior seizures, and CNS infections, particularly neurocysticercosis. Improving sanitation and timely treatment of CNS infections can help reduce epilepsy incidence. Despite the widespread use of Phenobarbital, its availability is hindered by supply shortages and the low socioeconomic status of affected individuals. Increasing medication availability with international support is essential. Promising therapies like P-glycoprotein inhibitors, gene therapy, and stem cell therapy require more data for their efficacy in Africa. Addressing the social impact of epilepsy is equally crucial, involving public education through school lectures, community awareness campaigns, and social media partnerships to reduce stigma. Our objective is to destigmatize epilepsy, enabling affected individuals to integrate into society and lead fulfilling lives. Global support is essential to address these issues in Africa, enabling improved research quality, advanced training for healthcare professionals in state-of-the-art laboratories, and enhanced patient care through international funding and collaboration.

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Author contribution

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