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Review

Traditional Approaches and Medicinal Plants in Treatment of Epilepsy in West and East Africa**Abdoulie Essa Mballow**^{1,2,3} **Ivan Kahwa**^{2,3,*} **Abdelgadir A. Abdelgadir**⁴**Thomas Adelina**^{2,3,5} **Patrick Engeu Ogwang**^{2,3}¹*National Traditional Medicine Programme, Ministry of Health & Social Welfare, Gambia.*²*Pharm-Biotechnology and Traditional Medicine Centre of Excellence (ACEII) P.O BOX 1410, Mbarara, Uganda.*³*Department of Pharmacy, Faculty of Medicine, Mbarara University of Science and Technology, Uganda*⁴*Department of Pharmacognosy, Faculty of Pharmacy, University of Gezira, Wad Medani, Sudan*⁵*Department of Pharmacognosy, Catholic University of Health and Allied Sciences-Bugando, Tanzania***ARTICLE INFO***Article history:*

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ABSTRACT

Background: Epilepsy has affected over sixty million people around the globe. Traditionally, communities have opted for complementary and alternative medicines (CAM) to help in the treatment of epilepsy which has worked for them and with minimal side effects. **Methodology:** A literature search was conducted from PubMed, Science Direct, Elsevier, Google Scholar, and many other sites that had studied on traditional approaches and medicinal plants which have been used commonly in west and east African communities and whose anticonvulsant or antiepileptic activities have been experimentally studied. **Results:** A total number of five traditional approaches for healing and nineteen medicinal plants were identified as the most commonly used by communities in west and east Africa, based on the literature which was available in ethnobotanical surveys and had experimental studies on anticonvulsant or antiepileptic conducted. **Conclusion:** In this study, twenty-four traditional approaches and medicinal plants were found in west and east Africa for the treatment of epilepsy. Further study on the phytoconstituents present in the medicinal plants should be carried out to isolate the active principles and to prove their pharmacological activities. Inclusion of the other well approved healing approaches and techniques recommended in epilepsy treatment in health settings.

Introduction:

Epilepsy is a chronic non-communicable condition characterized by recurrent seizures consisting of

brain changes that occur in more than twenty-four hours. Globally, according to the recent World Health Organization (WHO) records, fifty million

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people with at least eighty percent being diagnosed in low- and middle-income countries.¹ Epilepsy has continued to cause impaired physical, psychological and social misfit or functioning of those suffering from it, and more social and economic effects among families which have been affected, furthermore, there is a lot of stigmatization and discrimination among people with epilepsy which has discouraged them to seek proper diagnosis and care, the discrimination has rendered the able-bodied epileptic people become unemployed and underemployed.²

However, in conventional medicine, epilepsy is being described as a chronic brain syndrome possessing unknown etiology characterized by recurrent seizures and usually associated with loss of consciousness and also convulsions.³ The International League Against Epilepsy has classified epileptic seizures into four major types; firstly, absence seizures which are characterized by blinking of the eye and nodding syndrome accompanied by a person's ability to stare at anyone close to them without responding to them, the second subtype is called generalized tonic-clonic, it comprises of bilateral symmetric convulsive movements of all limbs with impairment of consciousness, the third type is known as myoclonic seizures, which consist of sudden and brief movements associated with consciousness which affect several muscles, the last subtype is known as atonic seizures, it involves the loss of body tone, often resulting in a head drop.⁴

In many developing African countries, epilepsy has been termed as a sickness caused by supernatural powers, a curse or caused by gods and then treated by incantation, herbs, rituals, visitation by evil spirits, or effect of witchcraft and magic to a modern scientific way of perception.^{5,6} In contrast to developed countries that use a sophisticated system of science-based medicine, developing countries especially those in Africa have traditional systems of medical care that compete with the recently introduced western-type scientific medicine.⁷

Drugs commonly known as anticonvulsants have been used for the treatment of epilepsy, which has shown up to unpredicted and undesired side effects, chronic toxicity, and defects in giving birth due to the long-time therapy exposed to patients with epileptic conditions and still patients remain unwell.⁸⁻¹⁰

Traditional Medicine has been in existence before any other modern medicine approach in the treatment used in the treatment of epilepsy. This has joined together knowledge, beliefs, phytomedicines, animal and mineral-based medicines, spiritual treatment and many more others to maintain well-being among the people with epileptic conditions.¹¹ Complementary and Alternative Medicine (CAM) techniques in the treatment of epilepsy include spiritual and religious healing techniques and the use of medicinal plants or herbs.¹²

In spiritual and religious healing of epilepsy, it is believed that the human brain is programmed to experience and explain parts of existence in spiritual terms. This method depends on two theories that are the religion of an individual or patient with epilepsy and the original experiences which the individual has been passing through.¹³

Religious or spiritual healing techniques in the management and treatment of epilepsy are:

Incantations /Prayer formulas (Ruqyah/Ruqya):

This treatment involves the use of prayers, magic charms or taboos, and ceremonies to move the spirit back to where it came from in case epilepsy has all things and effects whose causes and origin are unknown and believed to be superstitious, the reciter of Ruqyah normally does it behind curtains if he is recognized for his religiousness, trustworthiness and faith.¹⁴ Ruqyah may be accompanied by other medicinal prescriptions which altogether lead to the cure of epilepsy. So, the combination makes up the total treatment regime, and the omission of any element may abort the whole procedure and render it useless.^{15,16} For Ruqyah to occur, some guidelines and conditions must be followed, these include a patient's understanding of the message from the Quran and

also believe that its Allah who cures.¹⁷ It also helps in alleviating epileptic patients who have anxiety and depression, in a study carried out in Saudi Arabia, a given number of spiritual or faith healers appreciated and documented the use of Ruqyah in the treatment of epilepsy.¹⁸

Spitting cure (Al-Azima):

In this method of treatment, a person doing it normally lays his hand on the patient's head and spits at the patient after each verse to transfer blessings by mumbling of selected verses from the Quran. Recovery of the epileptic patient is always manifested by frequent and violent sneezing. So sneezing is believed to be the expulsion of harm from the body, thus one should be grateful when one sneezes.¹⁹

Ritual incensing (al-takhriga and al-bakhra):

This is used for the treatment of a large number of sicknesses including epilepsy. This treatment technique uses a white paper which is written on by the person offering the treatment with mostly holy verses from the Quran, the paper is then folded and given to the patient. The paper is then burnt as the patient bends over the burner enveloped in a cloth through which he inhales the fumes. The al-takhriga involves assorting of herbs which are burnt to mainly expel away the evil eye and subsequently protect against its influence. It (al-takhriga) contains the following herbs, *Abrus precatorius*, Coriander, Turmeric, *Commiphora pedunculata*, *Salicornia* sp. among others.²⁰

Erasure (al-mihaya):

This type of treatment involves the use of a drink called mihaya by Muslim healers and they do this writing verses in the Quran which are later washed and erased so this drink is termed as holy which is later given to the patient with epilepsy to take and drink. In some cases, the writing is made on the roots of a medicinal herb, which is boiled and the decoction taken as a drink or burnt as an incense. However, its effects are short and have limited potency.²¹

Phylacteries (hijab):

This treatment method consists of recommended verses from the Quran which are written on a white

paper, and in addition to the verses, other supplementary materials include at least one or more of the 99 names of God, archangels, angels, jinn, some astrological formulas, magical numbers, and seals. The white sheet of paper is then folded and placed on metal and hang around the neck or waist of the patient with epilepsy. It is effective depending on the reputation of the patient and also should be used by a person who is only affected by epilepsy, not any other.²⁰⁻²¹

Numerous herbal drug medicines have been used for the treatment of patients being affected by epilepsy, they do this by reducing the frequency of seizures, reducing the violence of seizures, and tolerance in treatment. This is due to their anticonvulsant activities which have proved them to be promising in phytotherapy of epileptic conditions.²²

Medicinal plants used in the management and treatment of epilepsy are:

***Moringa oleifera*:**

It belongs to family Moringaceae has been reported in folk medicine for the treatment of epilepsy. Normally leaves are used to make a paste which is later used to massage the elbow, knees, and feet of the epileptic patient until he or she recovers through topical administration.²³ A study carried out against maximal electroshock and picrotoxin induced convulsion in mice, demonstrated that fresh fruit juice of *Moringa oleifera* at a dose of 50 ml/kg and 100ml/kg can be used in the treatment of epilepsy since it showed a decrease in the serum malondialdehyde activity.²⁴ Dried leaves extracted with 90% methanol and aqueous extract of fresh leaves showed anticonvulsant activity carried out in adult albino mice against maximal electroshock induced seizures and pentylenetetrazole induced seizures.^{25,26}

***Centella asiatica*:**

It belongs to the Apiaceae family and traditionally, leaves of *Centella asiatica* are used in the treatment of epilepsy by squeezing them, and then the extract is drunk twice a day until the patient recovers.²³ The anticonvulsant effect was shown in methanol, hexane, chloroform, ethyl acetate, butanol and

water extracts of leaves of *Centella asiatica* on albino rats induced with pentylenetetrazole seizures at a dose of 200mg/kg for one week by showing an escalated recovery in the levels of acetylcholine and acetylcholinesterase.²⁷ Methanolic extracts from the whole *Centella asiatica* plant and aqueous leaf extract showed a positive activity against maximal electroshock and picrotoxin induced convulsion in adult male winstar albino rats and albino mice.^{28,29}

Bryophyllum pinnatum:

It belongs to family Crassulaceae. In an ethnopharmacological survey conducted in Cameroon, the roots of *Bryophyllum pinnatum* are pounded, mixed with water, and the mixture is then filtered and drunk once a day until no epileptic conditions are being shown by the patient.²³ Ethanolic extracts of leaves of *Bryophyllum pinnatum* showed anticonvulsant property against maximal electroshock induced convulsions and Pentylenetetrazole seizure model in mice at a dose of 200-400 mg/kg.³⁰

Ocimum gratissimum:

It belongs to the Lamiaceae family. In an ethnomedical study carried out in West Africa, the leaves of *Ocimum gratissimum* are normally dried and boiled in water, the decoction is then cooled and drunk once a day for the treatment of epileptic conditions. In Kenya, the leaves of *Ocimum gratissimum* are sniffed as a treatment for convulsions and seizures.³¹ Both chloroform and hydromethanolic extracts of the leaves of *Ocimum gratissimum* showed anticonvulsant activity against maximal electroshock and Pentylenetetrazole induced seizures in male winstar albino rats.³² In a study carried out on albino mice induce with maximal electroshock and pentylenetetrazole seizures, both methanol and petroleum ether leaf extracts showed anticonvulsant activity.³³

Psidium guajava:

It belongs to the Myrtaceae family. Locally in the treatment of epilepsy, the leaves of *Psidium guajava* are squeezed in water to make juice which is later drunk until the epileptic condition is no more. In an

experimental study conducted on albino mice, ethanolic extract of leaves of *Psidium guajava* showed significant antiepileptic activity at a dose of 400mg/kg against maximal electroshock and Pentylenetetrazole induced seizures.³⁴

Rauwolfia vomitoria:

It belongs to the Apocynaceae family. In a survey carried out on the use of medicinal plants for the treatment of epilepsy, the leaves and or root barks of *Rauwolfia vomitoria* are used by boiling in water and the decoction is then drunk for at least two times a day. Another ethnomedical survey in Cameroon identified that local communities normally use the leafy branches of *Rauwolfia vomitoria*, which are crushed with water and later on added to the seed powder, the mixture is then left to macerate for two days, then filtered and half a glass is drunk twice a day while avoiding mutton and game meat until the epileptic condition stops.³⁵ A study carried out on male albino mice indicated that the aqueous extract of leaves of *Rauwolfia vomitoria* showed anticonvulsant activity at a dose of 200 mg/kg in strychnine, picrotoxin and pentylenetetrazole induced seizure models.³⁶

Abrus precatorius:

It belongs to family Fabaceae. In an ethnobotanical survey carried out in Tanzania, leaves of *Abrus precatorius* are normally boiled with water and three tablespoonfuls of the infusion taken twice a day.³⁷ Ethanolic extracts of leaves of *Abrus precatorius* showed anticonvulsant activity against pentylenetetrazole, picrotoxin, and maximal electroshock induced seizures at the doses 100,200, 400 mg/kg in albino mice.³⁸

Securidaca longipedunculata:

It belongs to the Polygalaceae family. In Northern Nigeria, the Fulani/Hausa tribes use the barks and leaves in the treatment of epilepsy by drinking the extracts.³⁹ It was reported that an aqueous extract of roots of *Securidaca longipedunculata* showed anticonvulsant activity in an experiment conducted in mice using the strychnine and picrotoxin induced seizures at a dose of 100-400 mg/kg.⁴⁰ This family was reported to contain alkaloids, cardiac

glycosides, flavonoids, saponins, and tannins that help in the treatment of epilepsy.⁴¹

***Mitragyna inermis*:**

It belongs to family Rubiaceae and it is used by the Fulani and Hausa people in Nigeria to treat epilepsy, by using its leaves, bark, and roots.³⁹ The experiment conducted on aqueous and ethanol extracts of the bark of *Mitragyna inermis* in albino rats induced with pentylenetetrazole and strychnine seizure models, the results showed anticonvulsant activity. The extracts were also found to contain alkaloids, glycosides, flavonoids, and anthraquinones present in both aqueous and ethanol extracts which could have led to the anticonvulsant activity.⁴²

***Diospyros mespiliformis*:**

It belongs to the Ebanaceae family and in northern Nigeria, the Fulani and Hausa people use the leaves and barks in the treatment of epilepsy.³⁹ The methanolic extract of leaves of *Diospyros mespiliformis* showed anticonvulsant activity in a study conducted in mice, rats, and chicks induced with pentylenetetrazole, maximal electroshock, strychnine, picrotoxin and 4-aminopyridine seizure at doses of 50, 100 and 200 mg/kg.⁴³

An experiment on aqueous extract of stem bark of *Diospyros mespiliformis* showed neuropharmacological activity in the mice induced to pentylenetetrazole seizure at a dose of 100 and 200 mg/kg.⁴⁴

***Celtis integrifolia*:**

It belongs to the Ulmaceae family, the Hausa tribe in Nigeria uses the leaves, roots and bark in the treatment of epilepsy, it contains proline, gamma-aminobutyric acid, reducing sugars, gallic acid and leucocyanidin as the main active constituents.³⁹ Anticonvulsant properties were shown in a study conducted on the methanolic stem bark extract of *Celtis integrifolia* using pentylenetetrazole and 4-aminopyridine induced seizures tests in mice and maximal electroshock test in chicks at a dose of 200 mg/kg.⁴⁵ The anticonvulsant activity was shown in a similar study conducted on methanol leaf extract of *Celtis integrifolia* in maximal electroshock seizure model in chicks, pentylenetetrazole, 4-

aminopyridine and strychnine model in mice at a dose of 200, 400 and 800 mg/kg.⁴⁶

***Piper guineense*:**

It belongs to family Piperaceae and traditionally it is used in the treatment of epilepsy in Nigeria by using the extract from seeds.⁴⁷ An aqueous extract of the fruit of *Piper guineense* showed anticonvulsant activity in mice against N-methyl-DL-aspartate and maximal electroshock induced seizures at a dose of 300 mg/kg.⁴⁸

***Afzelia africana*:**

It is a medicinal plant that belongs to the Caesalpinioideae family which is commonly used for treating seizures or convulsions in Benin. An experimental study that was carried out by using an aqueous extract of leaves of *Afzelia africana* on winstar albino rat induced with pilocarpine showed anticonvulsant properties at a dose of 100 mg/kg.⁴⁹

***Spathodea campanulata*:**

It belongs to the Bignoniaceae family and its leaves and stem bark have been used by people of Nigeria and Cameroon in the treatment of epilepsy.³⁵ In a study conducted on mice, the ethanolic leaf extract of *Spathodea campanulata* showed anticonvulsant activities using pentylenetetrazole, picrotoxin, and maximal electroshock induced seizure models at a dose of 250 to 1,000 mg/kg.⁵⁰ Glycosides have been identified to be the active ingredient in the anticonvulsant activity of *Spathodea campanulata*.⁵¹

***Newbouldia laevis*:**

It belongs to family Bignoniaceae and it is used by people from Nigeria and Cameroon to treat epilepsy, they normally mix its dried stem bark and dried root bark of *Ficus sycomorus* boiled and then decoction drunk.³⁵ In a study conducted on the aqueous extracts of root and stem bark of *Newbouldia laevis* in albino mice against Electroshock-induced seizures, a positive anticonvulsant activity was shown at varying doses.⁵² Aqueous extracts of both leaves and roots of *Newbouldia laevis* at a dose of 200 to 800 mg/kg showed anticonvulsant activities in a study carried out on male rats treated with pentylenetetrazole

seizure model.⁵³ Furthermore, the ethanolic flower extracts of *Newbouldia laevis* were found to possess anticonvulsant potential in mice treated with pentylenetetrazole and 4-Amino pyridine seizure models at a dose of 50 to 200 mg/kg.⁵⁴

Ficus sycomorus:

It belongs to the Moraceae family and normally it is also used by people from Cameroon and Nigeria to treat epilepsy by combining its dried root bark and dried stem bark of *Newbouldia laevis* to make a decoction which is drunk.³⁵ The methanol root bark extract of *Ficus sycomorus* was found to have anticonvulsant activities in a study which was carried out on 4-Aminopyridine and maximal electroshock induced seizures in mice and chicks respectively at doses of 37.5, 75, and 150 mg/kg.⁵⁵ In addition to this, a flavonoid fractionated from an ethanolic extract of the stem bark of *Ficus sycomorus* experimented in mice and chicks against pentylenetetrazole and maximal electroshock induced seizures respectively showed anticonvulsant activities at a dose of 10 mg/kg.⁵⁶

Leucas martinicensis:

It belongs to Lamiaceae family and traditionally in Nigeria it is used to treat convulsions and epilepsy by smoking the leaves, in a study conducted using aqueous extracts of leaves of *Leucas martinicensis* in adult male albino rats induced with maximal electroshock and strychnine seizure models showed anticonvulsant activities at a dose of 200 and 400 mg/kg.⁵⁷ In another experimental study conducted on the ethanolic extracts of the whole plant of *Leucas martinicensis*, showed antiepileptic activities on swiss albino mice treated with pentylenetetrazole seizure model at a dose of 200 mg/kg and 400 mg/kg.⁵⁸

Annona senegalensis:

It belongs to the Annonaceae family and its leaves and roots are infused and used as a remedy for epilepsy in Guinea-Bissau, Burkina Faso, Nigeria, and Cameroon.^{59,60} In a study conducted on aqueous root bark extracts of *Annona senegalensis*, anticonvulsant activities in mice and rats induced with pilocarpine and picrotoxin seizures at a dose of 50 mg/kg were observed.⁶¹ The aqueous root

extract showed anticonvulsant properties in an experimental study conducted in Nigeria on mice induced with pentylenetetrazole and maximal electroshock convulsion models at a dose of 800 mg/kg.⁶² Furthermore, both methanolic and aqueous extracts of the stem bark showed anticonvulsant activities in mice and rats induced with pentylenetetrazole and pilocarpine seizures at a dose of 400 mg/kg.⁶³ The anticonvulsant activities were shown by methanolic root extracts in albino mice induced with pentylenetetrazole seizures at a dose of 200 mg/kg.⁶⁴ Anticonvulsant activities of *Annona senegalensis* are primarily caused by kaurenoic acid which is isolated from the root bark.⁶⁵

Boerhavia diffusa:

It belongs to the Nyctaginaceae family and its roots are used in Guinea-Bissau and Nigeria to treat convulsions.⁵⁹ The methanolic root extract showed anticonvulsant activities in swiss male albino mice against pentylenetetrazole induced seizures.⁶⁶

Future considerations and way forward:

Since a lot of medicinal plants have shown antiepileptic or anticonvulsant activities, they should be considered in the plan for making standardized herbal medicaments by utilizing the plant extracts or isolated most active compounds or pharmaceutical ingredient, there will be a possibility to protect ingredients from the most used plants which can be patented. For the case of traditional healing techniques, only those recognized by certain religions should be opted for since they are documented in their holy books. Traditional healers should be enticed to collaborate with the physicians in the management and treatment of epilepsy by appreciating their therapeutic approaches in the established health care systems and structures.

Conclusion:

The use of medicinal plants and other traditional techniques in the treatment of epilepsy has been in existence for a long time. So, the use of conventional or antiepileptic drugs has been limited due to their ability to show multiple side effects and

contraindications, this has therefore escalated the use of herbal remedies. A lot should be put in mind while using complementary and alternative medicine techniques especially doses, dosage form, frequency, efficacy, and toxicity of each medication being given to epileptic patients. Therefore, grants in the form of funds should be allocated to higher education institutions to carry out animal studies that could provide evidence for future clinical trials and validate the safer use of herbal medicine and traditional approaches in the cure of epilepsy.

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