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Review of Plants Used in Traditional Medicine to Treat Epilepsy in Tropical Africa

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ABSTRACT

Epilepsy is characterized by recurrent spontaneous seizures, defined as transient episodes of excessive and synchronous abnormal neuronal activity in the brain. The disease is more prevalent in tropical African countries, where a large proportion of the population relies on medicinal plants for its management. Consequently, ethnopharmacological surveys are essential for identifying plant species with potential therapeutic value. The main aim of this study was to systematically review and document medicinal plants traditionally used in the management of epilepsy in tropical Africa. A systematic literature search was conducted using relevant keywords, including "medicinal plants," "ethnopharmacological survey," "ethnobotanical survey," "epilepsy," and "tropical Africa." Databases such as Google Scholar, PubMed, ScienceDirect, African Journals Online, and Perplexity were consulted. A total of 192 plant species, belonging to 155 genera and 64 families, were documented as having potential anti-epileptic properties. The families Fabaceae (15.63%) and Asteraceae (10.42%) exhibited the highest species diversity. Approximately 87% of the recorded species were reported from Central African countries, including Cameroon (158 species), the Democratic Republic of the Congo (125 species), the Central African Republic (111 species), Gabon (91 species), Angola (86 species), the Republic of the Congo (63 species), and Equatorial Guinea (56 species). The most frequently cited species for epilepsy management included *Elaeis guineensis*, *Nauclea latifolia*, *Bridelia ferruginea*, *Bidens pilosa*, *Carica papaya*, *Abrus precatorius*, *Terminalia superba*, *Euphorbia hirta*, *Myrianthus arboreus*, *Tetrapleura tetraptera*, and *Hibiscus sabdariffa*. Herbs and shrubs constituted the most frequently reported life forms. Leaves and roots were the most commonly used plant parts, while decoction was the predominant method of preparation and oral administration the principal route of use. Overall, this study highlights the high botanical diversity and significant ethnopharmacological potential of anti-epileptic medicinal plants in Central Africa.

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Introduction

Epilepsy is a chronic disease, while the causes are not well known, and characterised by recurrent spontaneous seizures related to excessive and synchronous abnormal neuronal activity in the brain which affects around 50 million people worldwide (WHO, 2024; Safeer et al., 2024). More than 80% of whom live in developing countries (Ngugi et al., 2010) where many remain untreated (Newton and Garcia, 2012). According to the WHO (2023), 70% of people with epilepsy could be seizure-free if their condition were properly diagnosed and treated. The prevalence of epilepsy in sub-Saharan Africa varies between 7 and 14.8‰ (Ngugi et al., 2010). In this part of Africa, the number of new cases of epilepsy is increasing, ranging from 63 to 158 per 100,000 inhabitants per year (Ngugi et al., 2010).

The conventional management of epilepsy is essentially based on the use of synthetic anti-epileptic drugs (AEDs) such as lamotrigine and vigabatrin (Chung et al., 2007), which are used for symptomatic treatments (Liu et al., 2017). In addition, some of these drugs present side effects, including the drowsiness, nausea delirium and hepatotoxicity as well as other idiosyncratic reactions (Zaccara and Perucca, 2015). There is a significant disparity in the epileptic treatment access between countries in the Global North and Global South (Harimanana et al., 2013; Moyano et al., 2014) due to the availability and lower cost of treatment facilitated by public authorities in developed countries (Singh and Sander, 2020). Moreover, this treatment gap could be partly attributed to myths, misconceptions, and misunderstandings about epilepsy, especially in tropical Africa (Liu et al., 2017). Therefore, epilepsy management represents a real challenge of public health issue for many governments in low- and middle-income countries where people are increasingly turning to the use of traditional medicine (Bum et al., 2011). This is the case in tropical African countries, where the use of plants for the treatment of epilepsy remains one of the predominant alternatives (Liu et al., 2017).

Several systematic reviews based on anti-epileptic used plants have been conducted in Africa at local and national levels (Jiofack et al., 2008; Stafford et al., 2008; Nadembega et al., 2011; Kantati et al., 2016; Suleiman et al., 2022). At a continental scale, the studies conducted cover a range of disorders related to the central nervous system, including Parkinson's disease, multiple sclerosis, Alzheimer's disease, and stroke, and are therefore not specific to epilepsy. Furthermore, these studies limit themselves to citing plants without actually verifying the status of scientific names (accepted or synonymous) or associating species distribution in order to improve knowledge of anti-epileptic plants in countries where these species are occurred. Therefore, the inventory, updating of taxonomic ranks, and geographical distribution of species used to treat epilepsy constitute an efficient scientific database that can contribute to the development of new therapeutic strategies.

Materials and Methods

Search Methodology

This study brings together ethnopharmacological and ethnobotanical surveys conducted on plants used in traditional medicine in tropical Africa to treat epilepsy. This study started on july 2022 and ended on December 2024; period in which articles were searched using the following keywords: 'ethnobotany', 'ethnopharmacology', 'epilepsy' and 'Tropical Africa', by combining the names of certain countries in this region such as Gabon, Cameroon, Nigeria and the Democratic Republic of the Congo. Various reputable electronic databases were consulted, including Google Scholar, PubMed, ScienceDirect, African journal online, Medline, and Perplexity. Each article was then examined individually, and the plants traditionally used to treat epilepsy were compiled and organized into a database. A meticulous analysis was carried out on selected articles in order to compile information according to the accepted name and distribution (using World Flora Online database), life forms, usable parts, preparation methods, and the administration routes of plants recorded to manage the epilepsy in tropical Africa.

Data Extraction

The articles selected for this study were chosen on the basis of the titles and abstracts obtained using keywords in the consulted electronic databases, and by thoroughly reviewed and validating the eligible articles.

Inclusion and Exclusion Criteria

This systematic review focused on published articles, so the main objective was to identify medicinal plants used in tropical Africa for the management of epilepsy. The research examined the type of plant, the parts used, the methods of preparation, and the route of administration. Only full-text publications published in English or

French were considered. Articles dealing with plants used to treat epilepsy outside tropical African countries were excluded from this study. This is also the case of the articles that list plants species used in treatment of central nervous system diseases in general without specifically mentioning epilepsy. Narrative reviews, editorials, letters to the editor, and non-systematic reviews were excluded. In addition, publications in languages other than English and French were eliminated unless a high-quality translation was provided. Unpublished works, such as preprints, conference abstracts, and theses without peer review, were excluded from consideration.

Results

Plants Used in Tropical Africa Against Epilepsy

Careful analysis of the selected articles enabled us to identify 192 plant species (Table 1) used in the treatment of epilepsy in tropical Africa. This demonstrates the great species richness of this region, which boasts the second largest plant reserve on our planet. This result also proves that local populations have a good knowledge of ethnobotany and ethnopharmacology, especially with regard to the treatment of epilepsy, which means that people with this condition are most often treated traditionally in developing countries due to the lack of an appropriate healthcare system.

Table 1: The 192 medicinal plants used against epilepsy in Tropical Africa

Number	Scientific names	Families	Types of plants	Parts used	Method of preparation	Route of administration	References
1	*Abrus precatorius* L.	Fabaceae	Shrub	Leaf	Decoction	Oral	Solanki and Zaveri, 2012 ; Kantati et al., 2016
2	*Acacia amythethophylla* Steud.	Fabaceae	Tree	Root	Powder	Oral, Skin	Tabuti et al., 2003
3	*Acacia seyal* Delile	Fabaceae	Tree	Bark	Powder	Oral	Tabuti et al., 2003; Muazu and Kaita, 2008; Ashour et al., 2022
4	*Acanthus montanus* (Nees) T.	Acanthaceae	Herb	Root, Leaf	Decoction	Oral	Okoli et al., 2008 ; Suleiman et al., 2022
5	*Adansonia digitata* L.	Malvaceae	Tree	Bark	Maceration	Oral	Tabuti et al., 2003
6	*Aganope stuhlmannii* (Taub.) Adema	Fabaceae	Tree	Root	Powder	Oral	Jiofack et al., 2009; Tchacondo et al., 2012
7	*Ageratum conyzoides L.*	Asteraceae	Herb	Stem, Leaf	Maceration	-	Jiofack et al., 2009
8	*Ajuga integrifolia* Buch. - Ham.	Lamiaceae	Herb	Leaf	Powder	Oral	Woldeamanuel et al., 2014
9	*Albizia anthelmintica* Brongn.	Fabaceae	Shrub	-	Decoction	Oral	Chhabra et al., 1984; Thoithi et al., 2002
10	*Albizia glaberrima* (Schumach. & Thonn.) Benth.	Fabaceae	Shrub	Leaf	-	-	Wada et al., 2023
11	*Alchornea laxiflora* (Benth.) Pax & K. Hoffm.	Euphorbiaceae	Shrub	Leaf	Powder	Skin	Suleiman et al., 2022
12	*Allium cepa L.*	Alliaceae	Herb	Bulb	Decoction Powder	Skin	Ajibesin et al., 2008; Focho et al., 2009
13	*Allium sativum* L.	Liliaceae	Herb	Bulb	Decoction Maceration	Oral	Focho et al., 2009
14	*Ambassa hochstetteri* (Sch.Bip. ex Hochst.) Steetz	Asteraceae	Herb	Root	Decoction		Hedberg et al., 1982
15	*Anacardium occidentale* L.	Anacardiaceae	Shrub	Root	Powder	Oral	Tchacondo et al., 2012
16	*Annona muricata* L.	Annonaceae	Shrub	Leaf	Decoction Infusion	Oral	N'Gouemo et al., 1997 ; Bum et al., 2011
17	*Annona senegalensis* Pers.	Annonaceae	Shrub	Root, Leaf	Decoction Infusion	Oral	Bum et al., 2011; Konate et al., 2012; Tchacondo et al., 2012

	Table 1. Continued.						
18	*Anthocleista djalonensis* A. Chev.	Gentianaceae	Tree	Leaf	Decoction	Oral	Tchacondo et al., 2012
19	*Anthocleista schweinfurthii* Gilg	Gentianaceae	Shrub	Leaf	Decoction	-	Jiofack et al., 2009
20	*Antidesma venosum* E. Mey.	Phyllanthaceae	Tree	Root	Infusion		Focho et al., 2009
21	*Archidendron chevalieri* (Kosterm.) I.C. Nielsen	Fabaceae	Shrub	Leaf	-	-	Wada et al., 2023
22	*Aristolochia bracteolata* Lam.	Aristolochiaceae	Herb	Leaf	Decoction	Oral	Chhabra et al., 1984; Mathew et al., 2020
23	*Aspilia africana* (Pers.) C.D. Adams	Asteraceae	Herb	Leaf	-	-	Wada et al., 2023
24	*Asystasia gangetica* (L.) T.	Acanthaceae	Herb	Leaf	Powder	Skin	Mounanga et al., 2018; Suleiman et al., 2022
25	*Baccharoides guineensis* (Benth.) H.Rob.	Asteraceae	Shrub	-	-	-	Jiofack et al., 2009
26	*Baccharoides lasiopus* (O. Hoffm.) H. Rob.	Asteraceae	Herb	Leaf	Decoction	-	Hedberg et al., 1982
27	*Bidens pilosa* L.	Asteraceae	Herb	Leaf	Decoction Powder	Skin	Bum et al., 2011 ; Ngoua-Meye-Misso et al., 2019
28	*Borassus aethiopum* Mart.	Arecaceae	Tree	Tree	Decoction	Skin	Tchacondo et al., 2012
29	*Boscia angustifolia* A. Rich.	Capparaceae	Tree	Bark	-	-	Jazy et al., 2017
30	*Boscia senegalensis* (Pers.) Lam ex	Capparaceae	Shrub	Root Bark Leaf Fruit	-	-	Jazy et al., 2017
31	*Boswellia dalzielii* Hutch.	Burseraceae	Tree	Bark	-	-	Wada et al., 2023
32	*Brassica nigra* (L.) W.D.J. Koch	Brassicaceae	Herb	Fruit	Decoction	Oral	Suleiman et al., 2022
33	*Bridelia cathartica* G. Bertol.	Phyllanthaceae	Shrub	Root	Powder	Nasal	Gelfand, 1985
34	*Bridelia ferruginea* Benth.	Phyllanthaceae	Shrub	-	-	-	Yeboah et al., 2022
35	Bulbine latifolia (L. f.) Spreng.	Asphodelaceae	Shrub	-	-	-	Broster et al., 1981
36	*Burkea africana Hook.*	Fabaceae	Tree	Root	Powder	Oral	Tchacondo et al., 2012
37	*Cadaba kirkii Oliv.*	Capparaceae	Shrub	Root	Decoction	Oral	Chhabra et al., 1984
38	*Calotropis procera* (Aiton) W.T. Aiton	Asclepiadaceae	Herb	Leaf	Maceration Powder	-	Nadembega et al., 2011; Kantati et al., 2016; Mounanga et al., 2018
39	*Canarium schweinfurthii* Engl.	Burseraceae	Tree	Flower	Decoction	Oral	Kandeda et al., 2021
40	*Cannabis sativa* L.	Cannabaceae	Herb	Flower	Infusion	Oral	Kantati et al., 2016
41	*Capparis tomentosa* Lam.	Capparaceae	Shrub	Root	-	Skin	Giday et al., 2007
42	*Carica papaya* L.	Caricaceae	Tree	Root	Decoction	Oral	Suleiman et al., 2022
43	*Carissa spinarum* L.	Apocynaceae	Tree	Root	Decoction	Oral	Jeruto et al., 2008; Wada et al., 2023
44	*Cassia fistula* L.	Fabaceae	Shrub	Bark	Powder	Oral	Chhabra et al., 1984
45	*Cassia sieberiana* DC.	Fabaceae	Tree	Root	Decoction Maceration	Oral	Kantati et al., 2016
46	*Catunaregam nilotica* (Stapf) Tirveng.	Rubiaceae	Tree	Fruit	-	-	Hedberg et al., 1982; Wada et al., 2023
47	*Celtis toka* (Forssk.) Hepper & J.R.I. Wood	Ulmaceae	Tree	Bark	-	-	Muazu and Kaita, 2008; Sheik et al., 2014

Table 1. Continued.

48	*Cenchrus americanus* (L.) Morrone	Poaceae	Herb	Seed	-	-	Wada et al., 2023
49	*Cenchrus purpureus* (Schumach.) Morrone	Poaceae	Herb	Bulb, Leaf	Maceration	-	Jiofack et al., 2009, 2010
50	*Centaurea praecox* Oliv. & Hiern	Asteraceae	Herb	Leaf	-	-	Muazu and Kaita, 2008; Sheik et al., 2014
51	*Chrysanthellum indicum* DC.	Asteraceae	Herb	Whole plant	-	-	Wada et al., 2023
52	*Cissus aralioides* Planch.	Vitaceae	Creeper	Root	Decoction	Oral	Kantati et al., 2016
53	*Cissus cornifolia* (Baker) Planch.	Vitaceae	Herb	Root, Leaf	-	-	Wada et al., 2023
54	*Citrus ×limon* (L.) Burm. f.	Rutaceae	Shrub	Root	-	Oral	Sheik et al., 2014
55	*Citrus maxima* (Burm.) Merr.	Rutaceae	Shrub	Fruit	Powder	Oral	Sheik et al., 2014
56	*Clausena anisata* (Willd.) Hook.f. ex Benth.	Rutaceae	Shrub	-	-	-	Mounanga et al., 2018
57	*Clematis hirsuta* Guill. & Perr.	Ranunculaceae	Herb	Leaf	-	Nasal	Focho et al., 2009
58	*Cochlospermum tinctorium* Perrier ex A. Rich.	Bixaceae	Shrub	Root, Bark	-	-	Wada et al., 2023
59	*Combretum adenogonium* Steud.	Combretaceae	Tree	-	-	-	Gelfand, 1985
60	*Combretum collinum* Fresen.	Combretaceae	Tree	Root	-	Oral	Tabuti et al., 2003; Muazu and Kaita, 2008
61	*Combretum micranthum G.* Don	Combretaceae	Shrub	-	-	-	Nadembega et al., 2011
62	*Commiphora kerstingii* Engl.	Burseraceae	Tree	Leaf	-	-	Wada et al., 2023
63	*Combretum molle* R. Br.	Combretaceae	Shrub	Root	-	-	Gelfand, 1985
64	*Conyza pyrrhopappa* Sch. Bip.	Asteraceae	Herb	Root	Decoction	-	Hedberg et al., 1982
65	*Crinum jagus* (J. Thomps.) Dandy	Amaryllidaceae	Herb	Bulb	-	-	Wada et al., 2023
66	*Crinum nubicum* Hannibal	Amaryllidaceae	Herb	Bulb	-	Oral	Kantati et al., 2016
67	*Crinum purpurascens* Herb.	Amaryllidaceae	Herb	Bulb	Decoction	-	Ngoungoure et al., 2019
68	*Crossopteryx febrifuga* (Afzel. ex G.Don) Benth.	Rubiaceae	Tree	-	-	-	Hedberg et al., 1982
69	*Cucumis hirsutus* Sond.	Cucurbitaceae	Herb	Root	-	-	Gelfand, 1985
70	*Culcasia falcifolia* Engl.	Araceae	Creepers	Root	-	Oral	Jeruto et al., 2008
71	*Cullen corylifolium* (L.) Medik.	Fabaceae	Herb	Leaf	Powder	Skin	Auditeau et al., 2019
72	*Cussonia arborea* Hochst.	Araliaceae	Tree	-	-	-	Irvine, 1961
73	*Cyperus articulatus* L.	Cyperaceae	Herb	Root, Leaf	Decoction	Oral	Bum et al., 2001; Herrera-Calderon et al., 2018
74	*Cyperus esculentus* L.	Cyperaceae	Herb	Seed	-	-	Wada et al., 2023
75	*Dacryodes edulis* (G. Don) H.J. Lam	Burseraceae	Tree	Bark	Decoction	-	Jiofack et al., 2009
76	*Daniellia oliveri* (Rolfe) Hutch. & Dalziel	Fabaceae	Tree	Root Bark	-	-	Bum et al., 2011
77	*Datura stramonium* L.	Solanaceae	Shrub	Leaf Fruit	-	-	Bum et al., 2011

	Table 1. Continued.						
78	*Delonix regia* (Bojer ex Hook.) Raf.	Fabaceae	Tree	Bark	Maceration	Oral	Sheik et al., 2014
79	*Dennettia tripetala* Baker f.	Annonaceae	Tree	Fruit	-	-	Wada et al., 2023
80	*Detarium microcarpum* Guill. & Perr.	Fabaceae	Shrub	Root, Bark, Leaf	Decoction	-	Bum et al., 2011
81	*Detarium senegalense* J.F.Gmel.	Fabaceae	Tree	Leaf	-	-	Wada et al., 2023
82	*Dichrostachys cinerea* (L.) Wight & Arn.	Fabaceae	Shrub		Decoction		Samuelsson et al., 1992 ; Mounanga et al., 2018
83	*Diospyros mespiliformis* Hochst.	Ebanaceae	Tree	Bark, Leaf	-	-	Muazu and Kaita, 2008; Sheik et al., 2014; Wada et al., 2023
84	*Dodonaea viscosa* Jacq.	Sapindaceae	Tree	Root	Decoction	Oral	Chhabra et al., 1984
85	*Dracaena fragrans* (L.) Ker Gawl.	Asparagaceae	Shrub	Root	-	Oral	Sheik et al., 2014; Wada et al., 2023
86	*Dracaena liberica* (hort. ex Gérôme & Labroy) Byng & Christenh.	Asparagaceae	Herb	Leaf	Decoction	Oral	Suleiman et al., 2022
87	*Dysphania ambrosioides (L.)* Mosyakin & Clemants	Amaranthaceae	Herb	Bark	-	-	Taïwe et al., 2011
88	*Ehretia cymosa* Thonn.	Boraginaceae	Shrub	Root, Leaf	Infusion	Oral	Jeruto et al., 2008
89	*Elaeis guineensis* Jacq.	Arecaceae	Tree	Root	Powder	Skin	Suleiman et al., 2022
90	*Emilia coccinea* (Sims) G. Don	Asteraceae	Herb	Leaf	Decoction	-	Jiofack et al., 2010
91	*Emilia sonchifolia* (L.) DC.	Asteraceae	Herb	Leaf	-	-	Wada et al., 2023
92	*Erythrina senegalensis* DC.	Fabaceae	Shrub	Bark, Leaf	Decoction	-	Ngoungoure et al., 2019
93	*Euclea racemosa* L.	Ebenaceae	Herb	Root	Decoction	Oral	Goel et al., 2015
94	*Euphorbia hirta* L.	Euphorbiaceae	Herb	Whole plant	Decoction	-	Bum et al., 2011
95	*Euphorbia tirucalli* L.	Euphorbiaceae	Herb	Aerial	-	-	Mali and Panchal, 2017
96	*Evolvulus alsinoides* (L.) L.	Convolvulaceae	Herb	Whole plant	-	-	Wada et al., 2023
97	*Ficus platyphylla* Delile	Moraceae	Tree	Bark,	-	-	Wada et al., 2023
98	*Ficus sycomorus* L.	Moraceae	Tree	Bark, Root	-	-	Wada et al., 2023
99	*Flacourtia indica* (Burm. f.) Merr.	Flacourtiaceae	Tree	Bark, Leaf, Fruit	-	-	Bum et al., 2011
100	*Flueggea virosa* (Roxb. Ex Willd.) Royle	Phyllanthaceae	Shrub	Root	-	-	Samuelsson et al., 1992
101	*Garcinia kola Heckel*	Clusiaceae	Tree	Fruit	Powder	Oral	Suleiman et al., 2022
102	*Gardenia ternifolia* Schumach. & Thonn	Rubiaceae	Shrub	Leaf	Decoction	Oral	Stafford et al., 2008
103	*Globimetula braunii* (Engl.) Danser	Loranthaceae	Shrub	Leaf	-	-	Wada et al., 2023
104	*Grewia forbesii* Harv.	Malvaceae	Shrub	Root	Decoction	-	Hedberg et al., 1982
105	*Gymnanthemum coloratum* (Willd.) H. Rob. & B. Kahn	Asteraceae	Shrub	Leaf, Flower	Infusion	Nasal	Hedberg et al., 1982
106	*Gymnosporia heterophylla* (Eckl. & Zeyh.) Loes.	Celastraceae	Shrub	Root	-	-	Hedberg et al., 1982
107	*Gymnosporia senegalensis* (Lam.) Loes.	Celastraceae	Shrub	Root	Decoction Powder	Oral	Tchacondo et al., 2012
108	*Helichrysum setosum* Harv.	Asteraceae	Herb	Leaf	Decoction	Oral	Chhabra et al., 1984
109	*Heterotis rotundifolia* (Sm.) Jacq.-Fél.	Melastomataceae	Herb	Whole plant	Decoction	Skin	Suleiman et al., 2022

Table 1. Continued.

110	*Hibiscus sabdariffa* L.	Malvaceae	Herb	Leaf	Decoction Infusion	Oral	Mounanga et al., 2018
111	*Hoslundia opposita* Vahl	Lamiaceae	Herb	Leaf	Decoction Infusion	Oral	Hedberg et al., 1982 ; Focho et al., 2009
112	*Hymenocardia acida* Tul.	Euphorbiaceae	Shrub	Root Bark Leaf	Infusion, Maceration	-	Bum et al., 2011; Wada et al., 2023
113	*Indigofera tinctoria* L.	Fabaceae	Herb	-	Decoction Powder	-	Samuelsson et al., 1992 ; Mounanga et al., 2018 ;
114	*Ipomoea carnea* Jacq.	Convolvulaceae	Herb	-	-	-	Mounanga et al., 2018
115	*Ipomoea involucrata* P. Beauv.	Convolvulaceae	Herb	Root	-	-	Wada et al., 2023
116	*Jatropha curcas* L.	Euphorbiaceae	Shrub	Aerial	-	-	Ajibesin et al., 2008; Prasad et al., 2012; Wada et al., 2023
117	*Jatropha gossypiifolia* L.	Euphorbiaceae	Shrub	Root Leaf	-	-	Bum et al., 2011; Wada et al., 2023
118	*Kalanchoe densiflora* Rolfe	Crassulaceae	Herb	Leaf	-	Skin	Tabuti et al., 2003
119	*Kalanchoe pinnata* (Lam.) Pers.	Crassulaceae	Herb	Leaf	Decoction	Skin	Bum et al., 2011; Wada et al., 2023
120	*Laggera aurita* Sch.Bip. ex Schweinf.	Asteraceae	Herb	Leaf	-	-	Wada et al., 2023
121	*Laggera crispata* (Vahl) Hepper & J.R.I. Wood	Asteraceae	Herb	Leaf	-	-	Gelfand, 1985
122	*Lannea barteri* (Oliv.) Engl.	Anacardiaceae	Tree	Bark	-	-	Wada et al., 2023
123	*Launaea cornuta* (Hochst. ex Oliv. & Hiern) C. Jeffrey	Asteraceae	Herb	Aerial	Decoction	-	Samuelsson et al., 1992
124	*Launaea nana* (Baker) Chiov.	Asteraceae	Herb	Root	Powder	Skin	Gelfand, 1985
125	*Leucas martinicensis* (Jacq.) R.Br.	Lamiaceae	Herb	Leaf	-	-	Wada et al., 2023
126	*Lippia multiflora* Moldenke	Verbenaceae	Herb	Bark	Decoction Maceration	Oral	Kantati et al., 2016
127	*Lophira lanceolata* Tiegh.	Ochnaceae	Tree	Leaf	Maceration	Skin	Tchacondo et al., 2012; Wada et al., 2023
128	*Maerua angolensis* DC.	Capparaceae	Tree	Stem	-	Nasal	
129	*Markhamia obtusifolia* (Baker) Sprague	Bignoniaceae	Herb	Root	Decoction	-	Hedberg et al., 1982
130	*Mesosphaerum suaveolens* (L.) Kuntze	Lamiaceae	Herb	Stem, Leaf	-	-	Jiofack et al., 2009
131	*Microglossa pyrifolia* (Lam.) Kuntze	Asteraceae	Herb	Whole plant	-	-	Hedberg et al., 1982; Taïwe et al., 2011
132	*Milicia excelsa* (Welw.) C.C.Berg	Moraceae	Tree	Leaf	-	-	Wada et al., 2023
133	*Millettia thonningii* (Schumach. & Thonn.) Baker	Fabaceae	Tree	Root, Bark	Decoction Powder	Oral	Tchacondo et al., 2012
134	*Mimosa pudica L.*	Fabaceae	Herb	Root	Decoction	Oral	Focho et al., 2009
135	*Mitragyna inermis* (Willd.) K. Schum.	Rubiaceae	Shrub	Root, Bark, Leaf	-	-	Muazu and Kaita, 2008; Wada et al., 2023
136	*Mitragyna stipulosa* (DC.) Kuntze	Rubiaceae	Tree	Leaf	-	-	Wada et al., 2023
137	*Momordica balsamina* L.	Cucurbitaceae	Herb	Root	-	-	Watt and Breyer-Brandwijk, 1962
138	*Momordica charantia* L.	Cucurbitaceae	Herb	Leaf	-	-	Jiofack et al., 2009
139	*Mondia whitei* (Hook.f.) Skeels	Apocynaceae	Liana	Leaf	-	-	Wada et al., 2023

	Table 1. Continued.						
140	*Morinda lucida* Benth.	Rubiaceae	Tree	Root	Decoction	Oral	Elufioye et al., 2010
141	*Moringa oleifera* Lam.	Moringaceae	Shrub	Bark Leaf	Decoction	Oral	Awodele et al., 2013; Wada et al., 2023
142	*Myrianthus arboreus* P. Beauv.	Urticaceae	Shrub	Fruit	Decoction	Oral	Bobuya et al., 2022
143	*Nauclea latifolia* Sm.	Rubiaceae	Shrub	Root	Decoction Powder	Oral	Taïwe et al., 2010; Tchacondo et al., 2012
144	*Ocimum gratissimum* L.	Lamiaceae	Herb	Bark Leaf	Decoction Infusion Powder	Oral, Skin	Suleiman et al., 2022
145	*Olax subscorpioidea* Oliv.	Olacaceae	Shrub	Fruit	-	-	Wada et al., 2023
146	*Oldeania alpina* (K. Schum.) Stapleton	Poaceae	Shrub	Root	Powder	Skin	Mounanga et al., 2018
147	*Oncoba spinosa* Forssk.	Salicaceae	Tree	Root	-	-	Tabuti et al., 2003
148	*Parkia biglobosa* (Jacq.) R.Br. ex G. Don	Fabaceae	Tree	Root Bark	Maceration Powder	Oral, Skin	Muazu and Kaita, 2008; Tchacondo et al., 2012
149	*Paullinia pinnata* L.	Sapindaceae	Liana	Root Bark	-	-	Wada et al., 2023
150	*Pellaea calomelanos* (Sw.) Link	Pteridaceae	Herb	-	Infusion	Oral	Gelfand, 1985
151	*Pergularia daemia* (Forssk.) Chiov.	Apocynaceae	Herb	Root	Decoction	Oral	Cheikhyoussef et al., 2011
152	*Pericopsis laxiflora* (Benth. ex Baker) Meeuwen	Fabaceae	Tree, shurb	Root Bark	Infusion	Skin	Bum et al., 2011; Tchacondo et al., 2012; Wada et al., 2023
153	*Philenoptera cyanescens* (Schumach. & Thonn.) Roberty	Fabaceae	Shrub	Root	Powder	Oral	Tchacondo et al., 2012
154	*Phyllanthus muellerianus* (Kuntze) Exell	Phyllanthaceae	Shrub	Root	Powder	Oral	Tchacondo et al., 2012
155	*Phyllanthus urinaria* L.	Phyllanthaceae	Herb	-	-	-	Mounanga et al., 2018
156	*Piliostigma thonningii* (Schumach.) Milne-Redh.	Fabaceae	Shrub	Bark	Decoction Powder	-	Tchacondo et al., 2012
157	*Piper guineense* Thonn.	Piperaceae	Liana	Fruit	-	-	Wada et al., 2023
158	*Premna quadrifolia* Schumach. & Thonn.	Verbenaceae	Herb	Leaf	Powder	Oral	Tchacondo et al., 2012
159	*Prosopis africana* (Guill.and Perr.) Taub.	Fabaceae	Tree	Root Bark Leaf	Decoction Powder	Oral	Taïwe et al., 2011; Tchacondo et al., 2012
160	*Pseudocedrela kotschyi* (Schweinf.) Harms	Meliaceae	Tree	Root, Leaf	Decoction Powder	Oral	Tchacondo et al., 2012
161	*Psiadia punctulata* (DC.) Vatke	Asteraceae	Herb	Root	Decoction	-	Hedberg et al., 1982
162	*Pyrenacantha staudtii* (Engl.)	Icacinaceae	Liana	Fruit	-	-	Wada et al., 2023
163	*Rauvolfia vomitoria* Wennberg	Apocynaceae	Shrub	Leaf	-	-	Wada et al., 2023
164	*Ricinus communis* L.	Euphorbiaceae	Herb	Leaf, Flower Fruit	Decoction	Skin	Bum et al., 2011; Cheikhyoussef et al., 2011
165	*Secamone afzelii* (Schult.) K. Schum.	Apocynaceae	Shrub	Leaf	Powder	Skin	Suleiman et al., 2022
166	*Securidaca longipedunculata* Fresen.	Polygalaceae	Shrub	Root Bark Leaf	-	-	Muazu and Kaita, 2008; Bum et al., 2011; Wada et al., 2023
167	*Senna alata* (L.) Roxb.	Fabaceae	Shrub	Leaf	Decoction	-	Jiofack et al., 2009
168	*Senna occidentalis* (L.) Link	Fabaceae	Shrub	Leaf	Decoction Powder	Skin	Moyano et al., 2014; Suleiman et al., 2022

Table 1. Continued.

169	*Senna singueana* (Delile) Lock	Fabaceae	Shrub	Root Bark Leaf Flower	Powder	Oral	Hedberg et al., 1982 ; Bum et al., 2011
170	*Solanecio mannii* Hook. f.	Asteraceae	Shrub	Root	Decoction	-	Jeruto et al., 2008
171	*Solanum incanum* L.	Solanaceae	Herb	-	Powder	-	Hedberg et al., 1982
172	*Solanum nigrum* L.	Solanaceae	Herb	Leaf	-	-	Wada et al., 2023
173	*Spathodea campanulata* P. Beauv.	Bignoniaceae	Tree	Leaf	-	-	Wada et al., 2023
174	*Spondias mombin* L.	Anacardiaceae	Tree	Root	Decoction	Oral	Suleiman et al., 2022
175	*Sterculia setigera* Delile	Malvaceae	Tree	Leaf	-	Oral	Kantati et al., 2016
176	*Stereospermum kunthianum* Cham.	Bignoniaceae	Shrub	Root	Decoction	Oral	Mounanga et al., 2018; Wada et al., 2023
177	*Synsepalum dulcificum* (Schumach. & Thonn.) Daniell	Sapotaceae	Shrub	Seed	-	-	Wada et al., 2023
178	*Tapinanthus globiferus* (A. Rich.) Tiegh.	Loranthaceae	Tree	Leaf, Flower	Decoction	-	Jiofack et al., 2009; Wada et al., 2023
179	*Tephrosia purpurea* (L.) Pers.	Fabaceae	Shrub	Whole plant	Decoction	Oral	Mounanga et al., 2018
180	*Terminalia mollis* M.A. Lawson	Combretaceae	Shrub	Root	-	-	Bum et al., 2011
181	*Terminalia schimperiana Hochst.*	Combretaceae	Shrub	Root	-	-	Tabuti et al., 2003
182	*Terminalia superba* Engl. & Diels	Combretaceae	Tree	-	-	-	Jiofack et al., 2009
183	*Tetrapleura tetraptera* (Schumach. & Thonn.) Taub.	Fabaceae	Tree	Stem Fruit	Decoction	-	Jiofack et al., 2010; Wada et al., 2023
184	*Trichilia emetica* Vahl	Meliaceae	Shrub	Root Bark	Decoction Powder	Oral	Bum et al., 2011; Tchacondo et al., 2012; Wada et al., 2023
185	*Uvaria leptocladon* Oliv.	Annonaceae	Shrub	Leaf	Decoction	-	Chhabra et al., 1984
186	*Uvariodendron connivens* (Benth.) R.E. Fr.	Annonaceae	Tree	Fruit	Decoction	-	Jiofack et al., 2008
187	*Voacanga bracteata* Stapf	Apocynaceae	Shrub	Bark	Powder	Oral	Focho et al., 2009
188	*Waltheria indica* L.	Malvaceae	Herb	-	Decoction	-	Hedberg et al., 1982
189	*Warburgia ugandensis* Sprague	Canellaceae	Tree	-	Powder	Oral	Chhabra et al., 1984,
190	*Withania somnifera* (L.) Dunal	Solanaceae	Herb	Root	Decoction	Oral	Goel et al., 2015
191	*Zanthoxylum chalybeum* Engl.	Rutaceae	Tree	-	Decoction	Oral	Chhabra et al., 198
192	*Zanthoxylum zanthoxyloides* (Lam.) Zepern. & Timler	Rutaceae	Shrub	Root	Decoction Maceration	Oral	Tchacondo et al., 2012

"– = missing information".

Diversity of Medicinal Plants Recorded and Their Distribution

The 192 medicinal plants identified belonged to 64 families and 155 genera (Table 1). Most of these plants (116 or 60.42%) were grouped into 14 families (Table 2). The Fabaceae and Asteraceae families had the highest number of medicinal plants used to treat epilepsy in tropical Africa (30 and 20 species, respectively). The predominance of these two families could be justified by the wide distribution of plant species from these families in Tropical Africa, especially in ruderal areas where they are extensively used in traditional medicine.

The plants listed include annual (*Solanum incanum* L.), biennial (*Allium cepa* L.) and perennial species (all of the 118 trees and shrubs). They are found in savannas (*Annona senegalensis* Pers.; *Bridelia ferruginea* Benth.), ruderal environments (*Bidens pilosa* L.; *Senna alata* (L.) Roxb.), and forest ecosystems (*Milicia excelsa*

(Welw.) C.C.Berg; *Tetrapleura tetraptera* (Schumach. & Thonn.) Taub.). Some of them are cultivated species like *Allium cepa* and *Solanum nigrum* L.

Almost 87% of all the 192 recorded species are found in Central African countries. These include Cameroon (158 species), Democratic Republic of the Congo (125 species), Central African Republic (111 species), Gabon (91 species), Angola (86 species), Republic of the Congo (63 species), Equatorial Guinea (56 species). The most cited plant species as widely used to treat epilepsy were: *Elaeis guineensis* Jacq., *Nauclea latifolia* Sm., *Bridelia ferruginea*, *Bidens Pilosa*, *Carica papaya* L., *Abrus precatorius* L., *Terminalia superba* Engl. & Diels, *Euphorbia hirta* L., *Myrianthus arboreus* P. Beauv., *Tetrapleura tetraptera*, and *Hibiscus sabdariffa* L.

Table 2. Genus and family diversity of plants used against epilepsy in Tropical Africa

Families	Number of genera (frequency in %)	Number of species (frequency in %)
Fabaceae	24 (15.48)	30 (15.63)
Asteraceae	16 (10.32)	20 (10.42)
Rubiaceae	6 (3.87)	7 (3.65)
Euphorbiaceae	5 (3.23)	7 (3.65)
Combretaceae	2 (1.29)	7 (3.65)
Apocynaceae	6 (3.87)	6 (3.13)
Phyllanthaceae	4 (2.58)	6 (3.13)
Lamiaceae	5 (3.23)	5 (2.60)
Malvaceae	5 (3.23)	5 (2.60)
Annonaceae	4 (2.58)	5 (2.60)
Capparaceae	4 (2.58)	5 (2.60)
Rutaceae	3 (1.94)	5 (2.60)
Burseraceae	4 (2.58)	4 (2.08)
Solanaceae	3 (1.94)	4 (2.08)
Other families	64 (41.29)	76 (39.58)
Total	155 (100)	192 (100)

Life forms and Used Parts of Plants

Based on selected articles about review of plants used to treat epilepsy in Tropical Africa, four life forms and eight parts of plants were recorded (Figure 1). Concerning plants life form, herb (35.41%) was the most commonly life form plant used by traditional practitioners for treating epilepsy in Tropical Africa (Figure 1A), followed by shrub (33.85%) and trees (27.60%). These three types of plant are widely distributed, making them easily accessible and explaining their extensive use in traditional medicine in this region. Regarding the used plant parts, the results showed that almost all parts of the plant are used in traditional medicine to treat this disease (Figure 1B). However, leaf (33.48%) and root (32.09%) were the most commonly used plant parts. This could be justified by the fact that they are the most accessible parts of plants and are available throughout the year in tropical Africa, and the high presence of antiepileptic compounds such as phenols, flavonoids and alkaloids in these parts of the plant.

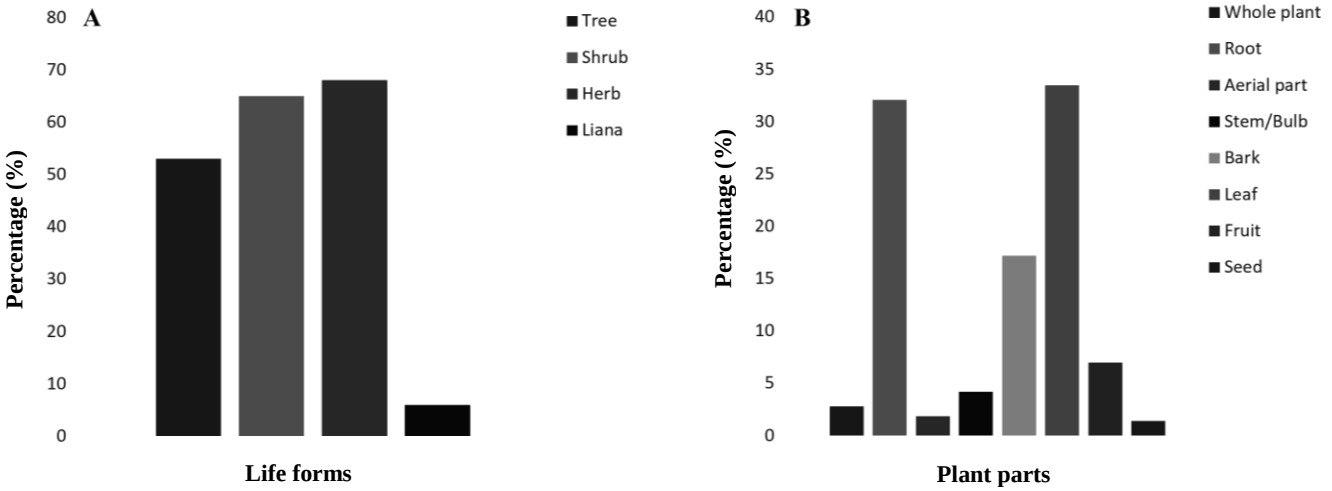

Figure 1. Life forms (A) and plant parts (B) used to treat epilepsy in tropical Africa

Preparation Methods and Administration Routes Recorded

The review conducted as part of this study highlighted four preparation methods combining three modes of administration (Figure 2). Decoction (54.07%) was the most predominant method of extraction used (Figure 2A), suggesting that this preparation method allowed the active ingredients to be extracted at high temperatures. This could be the case for the secondary metabolites present in recorded plant species. About routes of administration (Figure 2B), oral (73.40%) was the most widely used, despite cutaneous (21.00%) and nasal (4.60%). The oral route remains a very viable, especially in traditional medicine.

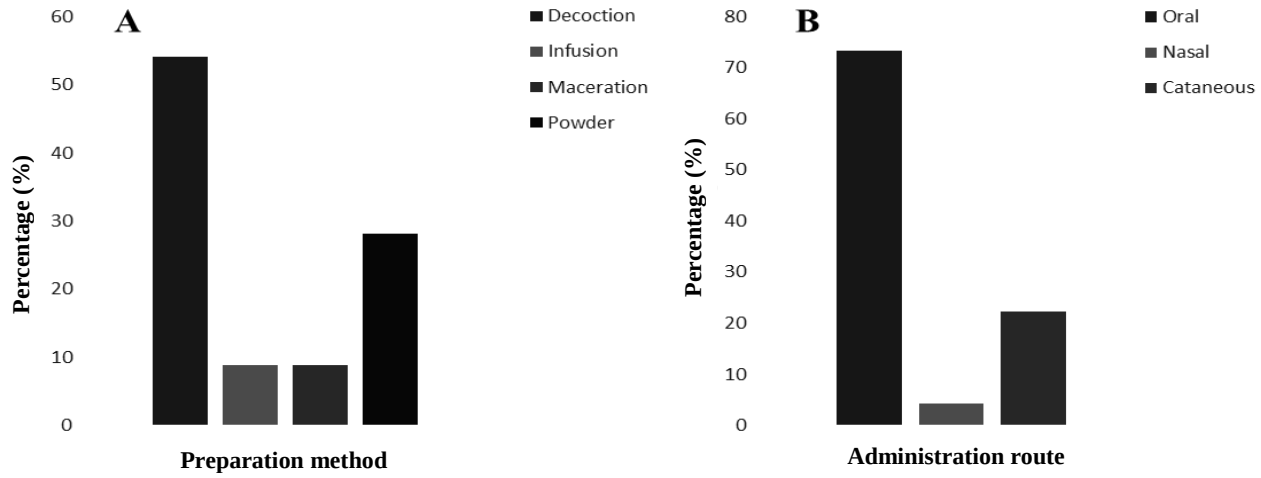

Figure 2. Preparation methods (A) and administration routes (B) are used to treat epilepsy in tropical Africa

Discussion

Plants play a key role in many healthcare systems, particularly in developing countries where modern medicines are often beyond the financial means of most people (Newman et al., 2003). In many cases, medicinal plants serve as an alternative to modern medicines. However, many communities around the world are losing traditional knowledge, possibly due to changing

lifestyles and formal education (Voeks, 2004). Therefore, it is crucial to preserve this ancestral knowledge in order to safeguard the potential of medicinal plants. This review has enabled us to establish that traditional medicine, which is essentially based on the use of medicinal plants in tropical Africa, plays a significant role in the treatment of epilepsy. Several studies conducted in various countries in tropical Africa have shown that various plant species are used by populations in this region to treat epilepsy. Examples include studies conducted by Bum et al. (2011) in Cameroon, Hedberg et al. (1982) in Tanzania, Jazy et al. (2017) in Niger, Jerotu et al. (2018) in Kenya, Tchacondo et al. 2012. Among these plants, we can mention: Nauclea latifolia, Bridelia ferruginea, Elaeis guineensis, Kalanchoe pinnata, Moringa oleifera, Myrianthus arboreus, Terminalia superba, Withania somnifera.

This systematic review enabled us to compile ethnobotanical and ethnopharmacological studies on anti-epileptic plants in tropical African countries. Ultimately, 192 species were identified, demonstrating the rich species diversity of this region, which is justified by a climate favourable to their development and spread. This study is comparable to that conducted by Auditeau et al. (2019) on plants used in Asia, Africa and Latin America in the treatment of epilepsy, where 351 plant species were cited in these regions as having anti-epileptic properties. This result could form a solid database for further pharmacological studies. This study also shows that the Fabaceae (15.63%) and Asteraceae (10.42%) families were the most represented. This contradicts the work of Faheem et al. (2022), who, in a similar study, found that the most frequently cited anti-epileptic plants belonged to the Lamiaceae family. Indeed, the Fabaceae family is the second most diverse family in the plant kingdom and its species are widely distributed throughout the world. These species are rich in phytochemical compounds (flavonoids, saponins, alkaloids, carotenoids, and phenolic acids) that offer various health benefits, particularly anti-epileptic properties. Regarding the Asteraceae family, the plants of this family is a widely distributed plant throughout the world and has been used since ancient time. Phytochemical investigatios of the Asteraceae family have revealed that many compoments from this family or higtly bioactive. These bioactive compounds interact with the neurological systems activated during epileptic seizures. Examples of these secondary metabolites include: flavonoids and alkaloids who improved GABAergic neurotransmission (Govindu and Adikay, 2014), saponins entrain the augmentation of GABAergic neurological communication (Aliyu et al., 2014) and tannins involved in the modulation GABA(A) réceptors and activation of benzodiazepines (Abubakar et al., 2016).

Herbs (35.41%) and shrubs (33.85%) were the types of plants most commonly used by the population. This is consistent with the work of Faheem et al. (2022), who demonstrated in a review of anti-epileptic plants that the most commonly used plants were herbs (42.15%) and shrubs (29.75%). This could be justified by the proximity of these populations to savannahs, which have vegetation that is conducive to agriculture and hunting, and are therefore more accessible. With regard to the parts of the plant used, leaves and roots were the most commonly cited. This observation is consistent with the findings of numerous studies that have highlighted variations in the concentrations of secondary metabolites from one plant to another, as well as in different parts of the same plant. The leaves and roots are the preferred sites for the accumulation of these compounds (Hyder et al., 2002). Three main routes of administration were identified in this study: oral (73,40%), cutaneous (22,34%) and nasal (4,25%). It appears that the oral route was the most commonly used by traditional practitioners. This seems to be due to the practicality of this route, particularly for anti-epileptic treatments, which are generally administered over a long period of time. The different parts of the plants are prepared by decoction, infusion and maceration, or administered in powder form. In this region of Africa, the most common method of preparing traditional medicines for the treatment of epilepsy is decoction. This finding is consistent with the results of several studies conducted in various African countries, notably Côte d'Ivoire and Togo (Nussbaumer et al., 1998). This shows that the bioactive compounds effective against epilepsy are extracted from plants at slightly higher temperatures.

Conclusion

The management of epilepsy poses a real challenge for populations in tropical Africa. Traditional medicine and medicinal plants remain a popular alternative for people living with the condition in this region. Ethnobotanical and ethnopharmacological surveys conducted in this region of the continent make it possible to identify plants that could be potential candidates for

pharmacological and phytochemical studies. These studies could lead to the development of improved traditional medicines that are effective, low-cost and have few side effects.

Declarations

Conflict of Interest

The author declares no conflict of interest related to the publication of this article.

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Ethical Considerations

As this study is a review article, it does not involve human or animal subjects and therefore does not require ethical approval or informed consent.

AI Use Disclosure

During the preparation of this work, the authors used a generative AI tool solely for language editing, grammar correction, and formatting assistance. The AI tool was not used for data analysis, interpretation, or generation of scientific conclusions. After utilizing the tool, the authors reviewed, revised, and verified all content and take full responsibility for the accuracy and integrity of the final manuscript.

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