Maerua angolensis DC. (Capparaceae): A Review of its Medicinal Uses, Phytochemistry and Pharmacological Properties

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Abstract: *Maerua angolensis* DC. is collected from the wild for its edible leaves and fruits, and is also used as a traditional medicine. This study is aimed at evaluating the ethnomedicinal uses, phytochemistry and pharmacological properties of *M. angolensis*. Results of the current study are based on data derived from several online databases such as Scopus, Google Scholar, PubMed and Science Direct, and pre-electronic sources such as scientific publications, books, dissertations, book chapters and journal articles. The articles published between 1960 and 2020 were used in this study. This study revealed that the aerial parts, bark, leaves, roots and stem bark infusion and/or decoction of *M. angolensis* are mainly used as a protective charm and ethnoveterinary medicine, and a traditional medicine for pain, cancer, fever, malaria, sores, wounds and gastro-intestinal problems. Phytochemical compounds identified from the species include alkaloids, amino acids, anthraquinones, betaines, cardiac glycosides, cyanidin, esters, fatty acids, flavonoids, glucosinolates, phenols, saponins, sterols, steroids, tannins and triperpenoids. Ethnopharmacological research revealed that *M. angolensis* extracts have acaricidal, anthelmintic, antibacterial, antifungal, antidiarrhoeal, anticonvulsant, anti-diabetic, antidepressant, anti-inflammatory, antioxidant, antinociceptive, anxiolytic, anti-urolithiatic, antiprotozoal, molluscicidal and nematicidal activities. There is need for extensive toxicological evaluations of crude extracts and compounds isolated from the species since *M. angolensis* contains potentially toxic compounds

Keywords: Capparaceae, indigenous pharmacopeia, *Maerua angolensis*, traditional medicine.

INTRODUCTION

Maerua angolensis DC. is a deciduous tree belonging to the Capparaceae or caper family. The genus name "*Maerua*" means "drooping" in reference to the drooping foliage [1]. The specific epithet "*angolensis*" implies that the type specimen of the species came from Angola [2]. The English common name of *M. angolensis* is "bead bean" or "bushveld bead-bean" or "long bead bean" [3,4]. Synonyms associated with the name *M. angolensis* include *M. arenicola sensu* Eyles, *M. bukobensis* Gilg & Gilg-Ben., *M. currorii* Hook. f., *M. emarginata* Schinz, *M. lucida* Hochst. ex A. Rich., *M. retusa* Hochst. ex A. Rich., *M. senegalensis* R. Br., *M. thomsonii* T. Anderson and *M. tomentosa* Pax. [5-7]. *Maerua angolensis* is a small to medium-sized and rounded tree which can grow up to 10 metres in height [4,8]. The bark on young stems is purplish to yellowish in colour with light grey corky lenticels, and smooth and grey to rough and dark grey, peeling off in small flakes on older stems [1]. The leaves of *M. angolensis* are simple, entire, alternate, elliptic to lanceolate in shape, dark green and glossy, and the surface is covered in short hairs. The flowers are axillary and solitary, borne in terminal spikes or clusters and sweetly scented, with whitish to pink stamens. The fruit is a non-splitting pseudo-pod that is irregularly constricted between the seeds. *Maerua angolensis* has been recorded in various types of woodland, wooded grassland, deciduous bushland, evergreen scrub, arid bushveld, termitaria, coastal thicket and fringing seasonal watercourses. The species is widespread in tropical Africa, from Senegal in the west, eastwards to Ethiopia and Kenya, through the Democratic Republic of Congo (DRC) southwards to Mozambique, Namibia and South Africa, mostly growing on sandy, loamy and rocky soils at an altitude ranging from sea level to 1700 m above sea level [5-11].

The fruits and leaves of *M. angolensis* are considered edible throughout the distributional range of the species [12-20]. The fruits and leaves of *M. angolensis* are also browsed by game and livestock [21-28]. This species is also used as an ornamental plant, live fence, hedge, shade and bee forage [1,4,29,30]. The bark and roots of *H. angolensis* are sold in informal herbal medicine markets as traditional medicine in Tanzania [31] and dried leaves are also traded in local markets as a leafy vegetable and famine food supplement [29]. But the fruits, leaves and roots of *M. angolensis* are regarded as poisonous [2,3] and in Tanzania, the leaves are used as fish poison [29,32,33] and the roots are sometimes used for homicidal purposes [32,34]. Thus, the aim of this review is to provide an integrated and detailed appraisal of the existing knowledge on the medicinal uses, phytochemistry and pharmacological properties of *M.*

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angolensis in an attempt to explore the therapeutic and functional potential of this species.

Medicinal Uses

The aerial parts, bark, leaves, roots and stem bark infusion and/or decoction of *M. angolensis* are mainly used as a protective charm and an ethnoveterinary medicine, and a traditional medicine for pain, cancer, fever, malaria, sores, wounds and gastro-intestinal problems (Table **1**; Figure **1**). Other medicinal applications recorded in at least two countries and supported by at least two literature reports include the use of bark, leaves, roots and stem bark infusion and/or decoction against convulsions, epilepsy, headache, jaundice, pregnancy disorders, purgative, sexually transmitted infections, gonorrhoea and skin problems (Table **1**).

Nutritional and Phytochemistry

Some researchers identified nutritional elements and phytochemical compounds from the aerial parts, leaves, roots and stem bark of *M. angolensis* and these

Table 1: Medicinal Uses of *Maerua angolensis*

Medicinal uses	Parts used	Country	Reference
Abortifacient	Roots	Tanzania	[32]
Anorexia	Leaves	Senegal	[29]
Aphrodisiac	Leaves, roots and stem bark	Tanzania	[32,29]
Asthenia	Leaves	Senegal	[29]
Cancer (breast and skin)	Bark, leaves and stem bark	Nigeria, South Africa and Sudan	[1,21,35,36]
Chest pains	Roots	Tanzania	[4]
Convulsions and epilepsy	Bark, leaves, roots and stem bark	South Africa and Tanzania	[1,21,29,37]
Fever and malaria	Leaves, roots and stem bark	Burkina Faso, Sudan, Tanzania and Yemeni	[29,31,38,39]
Gastro-intestinal problems (amoebic dysentery, diarrhoea and stomach ache)	Bark, leaves, roots and stem bark	Benin, Burkina Faso, South Africa and Tanzania	[1,19,21,29,37]
General malaise	Leaves	Yemeni	[38]
Headache	Leaves and roots	South Africa and Tanzania	[1,21,40]
Hypertension	Leaves	Burkina Faso	[39]
Influenza	Roots	Tanzania	[4,32,41]
Jaundice	Leaves	Benin and Burkina Faso	[29,39]
Lupus	Leaves	Tanzania	[32,34]
Pain	Aerial parts and leaves	Guinea, Nigeria and Yemeni	[38,42,43]
Pregnancy disorders (lactation and womb cleansing)	Leaves and roots	Botswana and Nigeria	[44-46]
Protective charm against lightning and witchcraft	Bark, roots and stem bark	Botswana, South Africa and Tanzania	[31,47,48]
Purgative	Bark, leaves, roots and stem bark	South Africa and Tanzania	[1,21,32,34,37,49]
Sexually transmitted infections and gonorrhoea	Roots	Botswana and Ethiopia	[44,50]
Skin problems (abscess and rash)	Roots	Botswana and Tanzania	[32,44]
Sores and wounds	Leaves, roots and stem bark	Botswana, Kenya, Mali and Tanzania	[23,32,44,51]
Toothache	Roots	Tanzania	[4,32,41]
Urolithiasis	Leaves	Eritrea	[52]
Ethnoveterinary medicine (anthelmintic, anthrax, bloat, infertility, mastitis, pneumonia and wounds)	Leaves, roots and stem bark	Ethiopia, Nigeria, South Africa and Sudan	[53-59]

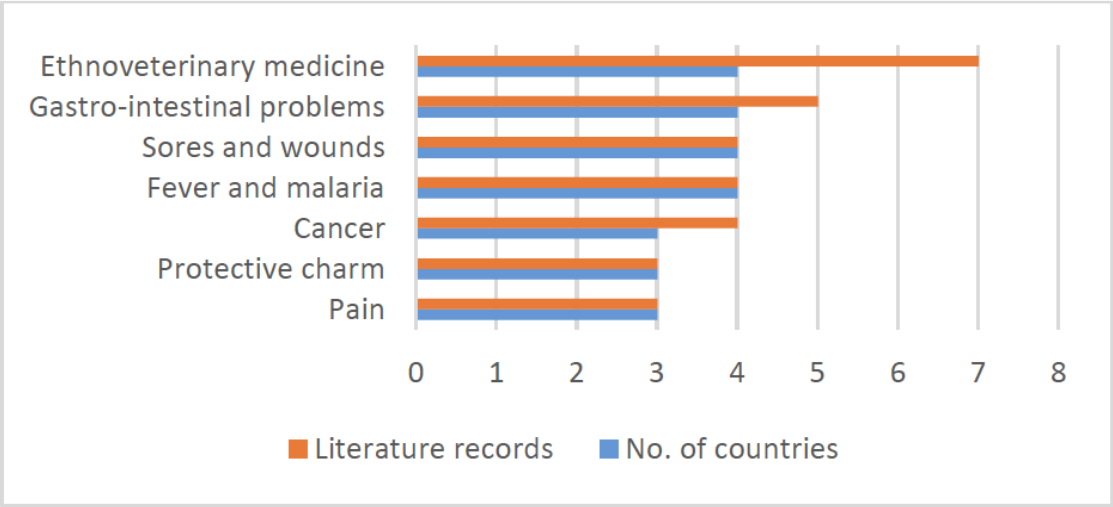

Figure 1: Medicinal applications of *Maerua angolensis* derived from literature records.

Table 2: Nutritional and Phytochemical Composition of *Maerua angolensis*

Nutritional and chemical compound	Value	Plant part	Reference
3-hydroxyprolinebetaine	-	Leaves	[79]
3-hydroxy-1,1-dimethyl prrolidinium	-	Leaves	[79]
Acid detergent fibre (g/kg dry matter)	128.3 – 321.0	Leaves	[24,25,26]
Acid detergent lignin (g/kg dry matter)	56.4 - 969.0	Leaves	[24,25,26]
Alkaloids (mg/100g)	271.3	Stem bark	[68]
Anthraquinones (mg/100g)	167.9	Stem bark	[68]
Arsenic (µg/g)	0.2	Roots	[44]
Ash (%)	12.9 – 13.3	Leaves and stem bark	[16,68]
Calcium (mg/100g)	4786.0	Leaves	[16]
Caloric value (kcal/100g)	169.8	Stem bark	[68]
Carbohydrate (%)	6.6 - 28.4	Leaves and stem bark	[16,68]
Chromium (µg/g)	1.0	Roots	[44]
Cobalt (mg/kg)	2.5	Leaves	[25]
Condensed tannin (g/kg)	0.4	Leaves	[26]
Copper (mg/100g)	4.7	Leaves	[16]
Crude fibre (%)	15.0 - 48.5	Leaves and stem bark	[16,68]
Crude oil (%)	3.1 – 6.3	Leaves and stem bark	[16,68]
Crude protein (%)	21.8 – 33.2	Leaves and stem bark	[16,68]
Cyanidins (g/kg dry matter)	0.03	Leaves	[24]
Dodecanoic acid	-	Aerial parts	[29]
Dry matter (%)	91.8	Leaves	[16]
Flavonoids (mg/100g)	176.9	Stem bark	[68]
Iron (mg/100g)	23.2	Leaves	[16]
Lead (µg/g)	0.2	Roots	[44]
Magnesium (mg/100g)	464.4	Leaves	[16]
Manganese (mg/100g)	1.9	Leaves	[16]
Moisture content (%)	3.6 – 7.9	Leaves and stem bark	[16,68]

(Table 2). Continued.

Nutritional and chemical compound	Value	Plant part	Reference
Molybdenum (mg/kg)	25.8	Leaves	[25]
Neutral detergent fibre (g/kg dry matter)	190.2 – 586.7	Leaves	[24,25,26]
Octadecanoic acid	-	Aerial parts	[29]
Organic matter (%)	86.7	Stem bark	[68]
Phenol (mg/100g dry weight)	2.0	Leaves	[16]
Phosphorus (mg/100g)	205.1	Leaves	[16]
Potassium (mg/100g)	832.2	Leaves	[16]
Prolinebetaine	-	Leaves	[79]
Reducing sugars (mg/100g)	41.2	Stem bark	[68]
Saponins (mg/100g)	225.6	Stem bark	[68]
Selenium (mg/kg)	19.5	Leaves	[25]
Sodium (mg/100g)	96.1	Leaves	[16]
Steroids (mg/100g)	112.3	Stem bark	[68]
Sulfur (g/kg)	2.1	Leaves	[25]
Tannin (mg/100g)	17.2 – 340.3	Leaves and stem bark	[16,68]
Tetradecanoic acid	-	Aerial parts	[29]
Total flavonoids (mg QE/g of fraction)	0.9 – 12.0	Leaves and stem bark	[80,81]
Total extractable phenolics (g/kg dry matter)	10.0 – 11.4	Leaves	[24,25]
Total condensed tannins (g/kg dry matter)	0.03 – 3.4	Leaves	[24,25]
Vitamin C (mg/100g)	3.9	Leaves	[16]
Zinc (mg/100g)	3.2	Leaves	[16]

include alkaloids, anthraquinones, betaines, cyanidin, fatty acids, flavonoids, phenolics, tannins, nutritional compounds, minor and major elements (Table **2**). Other phytochemical compounds identified from the leaves and stem bark of *M. angolensis* include amino acids, cardiac glycosides, esters, glucosinolates, phenols, resins, saponins, sterols, steroids, terpenoids and triperpenoids [52,60-68].

Pharmacological Properties

The following pharmacological activities have been documented from the fruits, leaves, stems and stem bark of *M. angolensis:* acaricidal, anthelmintic, antibacterial, antifungal, antidiarrhoeal, anticonvulsant, anti-diabetic, antidepressant, anti-inflammatory, antioxidant, antinociceptive, anxiolytic, anti-urolithiatic, antiprotozoal, molluscicidal and nematicidal activities.

Acaricidal Activities

Fouche *et al.* [58] evaluated the acaricidal activities of acetone and ethanol extracts of *M. angolensis* leaves and stems against tick species; *Rhipicephalus microplus* and *Rhipicephalus turanicus* using the Shaw larval and adult immersion test. The ethanol leaf extract exhibited 100.0% mortality against *Rhipicephalus microplus* while acetone leaf extract exhibited 100.0% mortality against *Rhipicephalus turanicus* [58].

Anthelmintic Activities

Fouche *et al.* [56] evaluated the anthelmintic activities of acetone extracts of *M. angolensis* leaves and stems against *Haemonchus contortus* using the egg hatch assay with albendazole as a positive control. The stem extract exhibited the best activities of 65.0% at a concentration of 2.5 mg/mL against 100.0% exhibited by the positive control [56].

Antibacterial Activities

Mothana et al. [65] evaluated the antibacterial activities of methanol and hot aqueous extracts of M. angolensis leaves against Staphylococcus aureus, Bacillus subtilis, Micrococuss flavus, Escherichia coli, Pseudomonas aeruginosa, Staphylococcus epidermidis

and Staphylococcus haemolyticus using agar diffusion method and broth micro-dilution assay with ampicillin (10.0 µg/disc) and gentamicin (10.0 µg/disc) as positive controls. The hot aqueous extract exhibited activities against Staphylococcus aureus and Staphylococcus epidermidis with zone of inhibition values of 16.0 mm and 12.0 mm, respectively. The minimum inhibitory concentration (MIC) values against Staphylococcus aureus, Bacillus subtilis and Micrococuss flavus were >1000.0 µg/ml [65]. Ayo et al. [66] evaluated the antibacterial activities of methanol and petroleum ether extracts of M. angolensis leaves against Staphylococcus aureus, Streptococcus pyogenes, Corynebacterium ulcerans, Bacillus subtilis, Escherichia coli, Salmonella typhi, Klebsiella pneumoniae, Pseudomonas aeruginosa and Neisseria gonorrhoeae using agar diffusion and micro dilution methods with sparfloxacin (30.0 µg/ml) as a positive control. The petroleum ether extract exhibited activities against Bacillus subtilis only while methanol extract exhibited activities against all of the tested pathogens with the zone of inhibition ranging from 10.0 mm to 22.0 mm against 35.0 mm to 45.0 mm exhibited by the positive control, and the MIC values ranged from 6.3 mg/ml to 25.0 mg/ml [66]. Yusuf et al. [67] evaluated the antibacterial activities of n-hexane, chloroform, water, ethyl acetate and methanol fractions of M. angolensis leaves against Staphylococcus aureus and Escherischia coli using the agar diffusion assay with ciprofloxacin as a positive control. All the fractions except water fraction exhibited activities with the zone of inhibition ranging from 9.0 mm to 16.0 mm against 22.0 mm to 30.0 mm exhibited by the positive control [67].

Antifungal Activities

Khan [60] evaluated the antifungal activities of petrol, ether and chloroform extracts of *M. angolensis* bark against *Trichophyton mentagrophytes* and *Candida albicans* using the agar diffusion assay with clotrimazole (50.0 µg), ketoconazole (50.0 µg) and nystatin (100.0 µg) as positive controls. The ether and chloroform extracts exhibited activities against *Trichophyton mentagrophytes* with the zone of inhibition values of 20.0 mm to 25.0 mm [60]. Ayo *et al.* [66] evaluated the antifungal activities of methanol and petroleum ether extracts of *M. angolensis* leaves against *Candida albicans* using agar diffusion and micro dilution methods with fluconazole (30.0 µg/ml) as a positive control. The methanol extract exhibited activities against the tested pathogen with the zone of inhibition of 17.0 mm in comparison to the zone of inhibition of 37.0 mm exhibited by the positive control and a MIC value of 12.5 mg/ml [66].

Antidiarrhoeal Activities

Magaji *et al.* [62] evaluated the antidiarrhoeal activities of the aqueous methanolic stem bark extract of *M. angolensis* using castor oil-induced diarrhoeal model in mice with loperamide as a positive control. The extract protected 80.0% of the mice at a dosage of 400.0 mg/kg compared to 100.0% exhibited by the positive control [62].

Anticonvulsant Activities

Magaji *et al.* [63] evaluated the anticonvulsant activities of hydroalcoholic extract of the stem bark of *M. angolensis* at doses of 200.0, 400.0 and 800.0 mg/kg in experimental animal models using maximal electroshock test, pentylenetetrazole and 4-aminopyridine-induced seizures, diazepam-induced sleep, hole board, and beam walking tests. Fifty percent of the chicks and 40.0% of the mice were protected against maximal electroshock test and 4-aminopyridine-induced seizure at the dosage of 400.0 mg/kg, respectively. In the pentylenetetrazole-induced seizure, 33.0% of the mice were protected at the dosage of 800.0 mg/kg. The extract reduced the mean number of head-dips in the exploratory test, shortened the onset and prolonged the duration of diazepam induced sleep at the dosage of 800.0 mg/kg [63]. Benneh *et al.* [72] evaluated the anticonvulsant activities of petroleum ether: ethyl acetate (50:50) extract of *M. angolensis* stem bark at doses ranging from 100.0 mg/kg to 1000.0 mg/kg were administered per os to male Sprague-Dawley rats after pre-treatment with flumazenil (0.3 mg/kg) or L-arginine (150.0 mg/kg) or sildenafil (5.0 mg/kg1) and subcutaneous injection of pentylenetetrazole (65.0 mg/kg). The extract exhibited antiseizure activities by affecting the GABAergic and nitric oxide-cGMP pathways [72].

Anti-Diabetic Activities

Mohammed *et al.* [64] evaluated the anti-diabetic activities of aqueous methanolic extracts of *M. angolensis* stem bark in streptozocin-induced diabetic rats at doses of 250.0 mg/kg, 500.0 mg/kg and 1000.0 mg/kg. The extract caused a reduction in the blood glucose levels [64].

Antidepressant Activities

Benneh *et al.* [73] evaluated the antidepressant activities of the petroleum ether: ethyl acetate (50:50)

extract of *M. angolensis* stem bark using the forced swim and tail suspension tests in mice at doses of the extract ranging from 100.0 mg/kg to 1000.0 mg/kg. The extract resulted in a reduction in immobility duration in the forced swim test at 300.0 mg/kg and tail suspension test at 1000.0 mg/kg [73].

Anti-Inflammatory Activities

Adamu *et al.* [61] evaluated the anti-inflammatory activities of aqueous methanolic extract of *M. angolensis* stem bark using carrageenan–induced hind paw oedema and cotton pellet granuloma models in rats. The extract exhibited dose-dependent activities in carrageenan-induced oedema in rats while in the granuloma pouch, the extract exhibited a 52.3% reduction in granuloma weight at the dose of 500.0 mg/kg [61]. Ampadu *et al.* [74] evaluated the acute anti-inflammatory activities of of petroleum ether: ethyl acetate extract of *M. angolensis* stem bark in acute inflammatory models. The anti-inflammatory activities of the extract at doses ranging from 30.0 mg/kg to 300.0 mg/kg were assessed on neutrophil infiltration, exudate volume, endogenous antioxidant enzymes in lung tissues and lung morphology using the carrageenan induced pleurisy model in Sprague Dawley rats. The extract exhibited anti-inflammatory activities by attenuating carrageenan induced pleurisy and decreasing acetic acid-induced vascular permeability [74].

Antioxidant Activities

Mothana *et al.* [65] evaluated the antioxidant activities of the methanol and hot aqueous extracts of *M. angolensis* using the 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging assay with ascorbic acid as a positive control. The methanol and hot aqueous extracts exhibited activities of 82.3% and 73.9%, respectively, at a concentration of 50.0 µg/ml [65]. Meda *et al.* [70] evaluated the antioxidant activities of n-hexane, dichloromethane, acetonitrile, ethyl acetate, methanolic and n-butanol fractions of *M. angolensis* leaves using the 2,2'-azinobis-3-ethylbenzothiazoline-6-sulphonate (ABTS), DPPH and ferric reducing antioxidant power (FRAP) assays. The extracts exhibited activities with FRAP values ranging from 150.7 - 450.0 µmol AAEAC/g of fraction, ABTS (22.9 – 117.9 µmol TEAC/g of fraction) and DPPH (3.8 – 81.1 µmol QEAC/ g of fraction) [70].

Antinociceptive Activities

Iliya *et al.* [75] evaluated the antinociceptive activities of the petroleum ether, ethyl acetate and hydroethanol extracts of *M. angolensis* stem bark in the formalin test in rats with diclofenac and morphine as reference analgesic agents and saline as a positive control. All the extracts exhibited antinociceptive activities by dose-dependently reducing the frequency and time spent in biting or licking of injected paws in both the neurogenic and inflammatory phases induced by formalin [75]. Iliya and Woode [76] evaluated the antinociceptive activities of petroleum ether and ethyl acetate extracts of *M. angolensis* stem bark using the acetic acid-induced abdominal writhing, formalin–induced nociception, prostaglandin E2–induced mechanical hyperalgesia, bradykinin and epinephrine-induced thermal hyperalgesia tests, and Paw withdrawal test in rats. The extracts produced dose-dependent activities in the acetic acid, formalin, prostaglandin E2, bradykinin, epinephrine and paw withdrawal tests [76]. Iliya *et al.* [77] evaluated the antinociceptive activities of the petroleum ether and ethyl acetate extract of *M. angolensis* stem bark in the vincristine-induced neuropathic pain model. The extract produced dose-dependent inhibition of vincristine-induced mechanical hyperalgesia, tactile and cold allodynia responses [77]. Iliya *et al.* [78] evaluated the antinociceptive activities of the petroleum ether : ethyl acetate extract of *M. angolensis* stem bark in the mouse tail-flick test using Hargreaves thermal hyperalgesia model. The extract administered orally at doses ranging from 3.0 to 30.0 mg/kg caused dose dependent attenuated nociception in the tail-flick test and possesses central analgesic effect, and suppressed morphine withdrawal syndrome via stimulation of GABA and adenosinergic transmission [78].

Anxiolytic Activities

Malami *et al.* [71] evaluated the the anxiolytic activities of hydromethanolic stem bark extract of *M. angolensis* using an animal model by conducting elevated plus maze and diazepam-induced sleeping time tests. The extract showed anxiolytic and sedative properties that exerted their effect on $GABA_A$ receptors [71]. Benneh *et al.* [79] evaluated the anxiolytic activities of petroleum ether : ethyl acetate fraction stem bark extract of *M. angolensis* and its possible mechanisms using zebrafish anxiety models. The extract demonstrated anxiolytic activities which could be a result of an interaction with the serotoninergic system and the $GABA_A$ receptor [79]. Benneh *et al.* [73] evaluated the the anxiolytic activities of petroleum ether: ethyl acetate (50:50) extract of *M. angolensis* stem bark using the Irwin, activity meter, convulsive

threshold, pentobarbitone induced sleeping time, regular Suok and elevated plus-maze tests in mice models. The extract demonstrated anxiolytic activities in mice [73].

Anti-Urolithiatic Activities

Solomon *et al.* [52] evaluated the *in vitro* anti-urolithiatic activities of aqueous, chloroform and ethanol extracts of *M. angolensis* leaves using turbidometric and titrimetric methods, and aggregation, growth and nucleation assays with cystone (10.0 mg/ml and 20.0 mg/ml) as the standard drug. The extracts exhibited inhibitory effects on calcium oxalate for crystal nucleation, aggregation and crystal growth, and dissolution of calcium oxalate crystals [52].

Antiprotozoal Activities

Kyere-Davies *et al.* [80] evaluated the antiprotozoal activities of ethanol extract of *M. angolensis* bark against *Giardia lamblia* using the *in vitro* susceptibility assay with metronidazole as a positive control. The extract exhibited activities with half maximal inhibitory concentration (IC_{50}) value of 20.0 µg/mL in comparison to an IC_{50} value of 10.5 µM exhibited by the positive control [80].

Molluscicidal Activities

Cepleanu *et al.* [81] evaluated the *in vitro* molluscicidal activities of aqueous, dichloromethane and methanol extracts of *M. angolensis* fruits, leaves and stem bark against *Biomphalaria glabrata* snails. Only aqueous stem bark extract exhibited activities [81].

Nematicidal Activities

Khosa *et al.* [82] evaluated the nematicidal activities of crudely milled powders of *M. angolensis* leaves on eggs and infective second-stage juveniles population densities of *Meloidogyne incognita* race 2 on tomato (*Solanum lycopersicum* L.), which was examined under glasshouse conditions. The extract showed suppressive effect on the tested pathogen [82].

Toxicity Activities

Cepleanu *et al.* [91] evaluated the toxicity activities of aqueous, dichloromethane and methanol extracts of *M. angolensis* fruits, leaves and stem bark against *Artemia salina* cysts using the brine shrimp toxicity assay. The dichloromethane extract of the fruits exhibited activities with median lethal concentration (LC_{50}) value of 8.7 µg/ml [91]. Fouche *et al.* [83] evaluated the toxicity of hot water and hydroethanolic (70:30) extracts of *M. angolensis* on Vero African Green monkey kidney cells and HepG2 human liver cancer cells using the tetrazolium-based (MTT) colorimetric assay with doxorubicin hydrochloride (Pfizer) as a positive control. The hydroethanolic extract exhibited a LC_{50} value of 27.0 µg/mL in comparison to a LC_{50} value of 1.5 µg/mL exhibited by the positive control [83].

CONCLUSION

Maerua angolensis is known to be poisonous [2,3,29,32-34] and there is a need for detailed clinical and toxicological evaluations of crude extracts and compounds isolated from the species. Therefore, the widespread use of *M. angolensis* as food plant and source of traditional medicines throughout its distributional range suggest that the species is not taken at toxic dosages. But the use of *M. angolensis* as food and for the treatment of human diseases and ailments should be treated with caution and rigorous toxicological and clinical studies of the bark, fruits, leaves and roots, and compounds isolated from the species are necessary.

CONFLICT OF INTEREST

No conflict of interest is associated with this work.

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