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EVALUATION OF ETHNOMEDICAL CLAIMS AND BRINE SHRIMP TOXICITY OF SOME PLANTS USED IN TANZANIA AS TRADITIONAL MEDICINES.

Mainen J.Moshi^{a*}, Zakaria H.Mbwambo^a, Ramadhani S.O.Nondo^a, Pax J.Masimba^a, Appolinary Kamuhabwa^b, Modest C.Kapingu^a, Pascal Thomas^b, Marco Richard^b.

Institute of Traditional Medicine^a, and School of Pharmacy^b, Muhimbili University
College of Health Sciences, P.O.Box 65001, Dar es Salaam, Tanzania.

E-mail: [*mmoshi@muchs.ac.tz](mailto:mmoshi@muchs.ac.tz) Tel: 255 22 2150096; Fax 255 22 2150465

Abstract

Using information from the literature it has been demonstrated that twenty one (21) plants out of 60 (35%) which are used in traditional medicine, in Tabora region (Western Tanzania), are used elsewhere for the treatment of similar conditions or their claims have proven biological results. Ethanol extracts of some of the plants exhibited low, some intermediate, and some high toxicity against brine shrimps. The brine shrimp assay results for *Psorospermum febrifugum* Spach (Guttiferae) [LC₅₀ 12.7µg/ml], agreed with previous reports of established anticancer activity, while for *Phyllanthus engleri* Pax. (Euphorbiaceae) [LC₅₀ 0.47µg/ml] they supported literature reports that it is toxic to rabbits and fish. Despite the therapeutic claims, literature reports, and brine shrimp assay results, more rigorous studies are needed to confirm the therapeutic utility of the plants.

Key words: Ethnomedical claims, Drug discovery approaches, Toxicity.

Introduction

A good number of Tanzanians use traditional medicines for their day to day health care needs. The use of traditional medicines has a strong cultural influence to the extent that, even in urban settings where many modern health care facilities are available, people still consult traditional healers. In Dar es Salaam, for example, it was previously reported that 21% of the people consult a traditional healer as their first referral point before going to a modern health care facility (Kilima et al., 1993). This is supported by the number of traditional healers who are practicing in towns. A survey of traditional healers treating epilepsy alone, in Dar es Salaam, was able to identify over 100 healers in one district who were managing epileptic patients (Moshi et al., 2005), indicating the importance and acceptability of their services. The challenge ahead is to authenticate the therapeutic efficacy and safety of the plants and other *matiria medica* that are being used.

This study evaluated the strength of therapeutic claims on some of plants collected from an ethnomedical survey in 3 districts of Tabora region (Western Tanzania), and also employed the brine shrimp lethality test as a preliminary tool to evaluate other potential biological activities that have not been reported by the traditional healers.

Materials and Methods

Materials

Ethanol was bought from Fisher Scientific UK Ltd. (Loughborough, Leicestershire, UK). Dimethyl sulphoxide (DMSO) was purchased from Sigma (Poole, Dorset, UK), and ethanol from Fisher Scientific UK Ltd (Bishop Meadow Road, Loughborough, Leicestershire, LE 11 5RG, UK). Brine shrimp eggs were bought from O.S.I. Marine Lab. Inc., Hayward, CA 94545, USA. Sea salt was prepared by evaporating water collected from the Indian Ocean along the Dar es Salaam coast.

Collection of Plant materials

The plants used in this study were collected from three districts of Tabora region, i.e. Tabora Municipality, Tabora Rural, and Urambo districts. Sixty (60) plants were selected from the list (Table 1) for inclusion in this study. The plants were identified by a botanist at the Department of Botany, Faculty of Science, University of Dar es Salaam, and voucher specimens are kept at the Herbarium of the Institute of Traditional Medicine, Muhimbili University College of Health Sciences. The Tabora Regional Branch of Traditional Healers Association was fully involved in the interviews and all national guidelines for working with traditional healers were followed.

Evaluation of the therapeutic claims based on the literature.

The literature was consulted to identify reports of similar uses elsewhere or proven biological results, as a basis to establish the value of the claims. The NAPRALERT data base of the University of Illinois, at Chicago, was used to download the literature cited in this work.

Preparation of plant extracts

Air-dried powdered plant materials (200g) were extracted with 80% ethanol (1L), concentrated under reduced pressure, *in vacuo*, followed by removal of residual water by freeze-drying. Extract yields of between 0.25-7.5% were obtained. The extracts were stored in a freezer, at -20°C, until needed for testing. On test day the extracts were dissolved in DMSO to appropriate working concentrations.

Brine shrimp lethality test

The brine shrimp lethality test (BST) was used to assay cytotoxic activity (Meyer et al., 1982). Assay procedures and analysis of results was done as reported earlier (Moshi and Mbwambo, 2005).

Table 1: The list of plants, vernacular names and their traditional medicinal uses.

Botanical name and Family	Voucher number	Vernacular name	Part used	Traditional uses [Supporting literature reports]	Method of preparation for use.
<i>Acacia amythethophylla</i> A. Rich. (Mimosaceae)	IMPP 002-0133	Imbulakuzova (Nyamwezi)	Stem bark	Asthma, psychosis, malaria	Extracted with hot water. Taken as tea at a dose of 1 cup three times a day.
<i>Afzelia quanzensis</i> Welw. (Caesalpinaceae)	IMPP 0107	002-Mkola (Nyamwezi)	Roots	Diabetes [Chhabra et al., 1987; Kokwaro, 1993]	Boiled and decoction taken three times a day
<i>Albizia harveyi</i> Fourn (Leguminosae)	IMPP 0040	002-Mpogolo (Nyamwezi)	Root bark	Curbanclis [Sawhney et al., 1978a]	Dried, Powdered, and soaked with warm water. Half a cup is drunk twice a day
<i>Asparagus flagellaris</i> (Kunth)Bak (Liliaceae)	IMPP 0108	002-Sawi (Nyamwezi)	Roots	Bilharziasis	Mixed with <i>Hymenodictyon parvifolium</i> , <i>Sansevieria conspicua</i> roots in water and one cup taken four times a day.
<i>Borassus aethiopum</i> Mart (Palmaceae)	IMPP 0177	002-Mhama (Nyamwezi)	Roots	Asthma	Fresh roots are dried, burnt into ashes and 1 teaspoon administered four times a day.
<i>Boscia salicifolia</i> Oliv. (Capparidaceae)	IMPP 0086	002-Melajikulu (Sukuma); Mguruka/nguruka (Nyamwezi)	Roots	Impotence [Haerdi, 1964]	Mixed with water and applied by rubbing on the stomach.
<i>Bridelia duvigneaudii</i> J.Leon (Euphorbiaceae)	IMPP 0057	002-Msalasi (Nyamwezi)	Whole roots	Diabetes	Fresh or dried roots are boiled with water and one teaspoonful taken 3 times a day for one to 2 weeks
<i>Burkea africana</i> Hook (Leguminosae)	IMPP 0132	002-Mgando (Nyamwezi)	Stem	Bilharzias and gonorrhea	Powder boiled with water, Insert a tea spoonful of the decoction into the urethra using a straw.
<i>Cadaba farinosa</i> Forsk (Capparidaceae)	IMPP 0102	002-Mtundusubuya(Nyamwezi)	Whole root	Cancer	Burnt and ashes mixed with butter or any other oil and applied to the wound.
<i>Cassia abbreviata</i> Oliv. (Caesalpinaceae)	IMPP 0037	002-Mlundalunda/mzoka (Nyamwezi)	Roots	AIDS, Malaria [Khan et al., 1980; Chhabra et al., 1987; Connely et al., 1996]	Fresh roots are dried, extracted and drunk three times a day.
<i>Catunaregum spinosa</i> Benth (Rubiaceae)	IMPP 0158	002-Mlenzi (Kiha); Mwisungu/Mochangoko (Nyamwezi)	Roots	Gonorrhea [Chhabra et al., 1991]	Dried powder, boiled with water, and one cup taken three times a day for 7 days.
<i>Chrysophyllum bangweolense</i> RE.Fr. (Sapotaceae)	IMPP 0114	002-Msebeye (Nyamwezi)	Root bark	Bilharzias, syphilis, gonorrhea.	Fresh/dried, boiled with water, together with <i>Securidaca longepedunculata</i> and <i>Rynchosia racemosa</i> roots.
<i>Cissus cornifolia</i> (Bak)Planch (Vitaceae)	IMPP 0070	002-Mtongangwaka (Nyamwezi)	Leaves	Epilepsy [Chhabra et al., 1993]	Combined with <i>Cassia singueana</i> Del is soaked with cold water and ½ a cup taken three times a day.
<i>Clerodendron uncinata</i> (Schinz)Moldenk (Verbenaceae)	IMPP 0007	002-Mkotakipwa (Nyamwezi)	Whole root	Gonorrhea	Dried powdered and extracted with hot water. One table spoonful is taken 3 times a day for 5 days.
<i>Combretum molle</i> G.Don (Combretaceae)	IMPP 0147	002-Mlama(Nyamwezi)	Roots	Malaria [Asres et al., 2001]	Dry powdered roots are boiled with water and 1 tea spoon taken three times a day for 2 days.

<i>Dalbergia melanoxylon</i> Guill. & Perrott. (Papilionaceae)	IMPP 0116	002-Mgembe (Nyamwezi)	Leaves	Cancer	Fresh leaves are ground and applied once a day for 1-3 months.
<i>Desmodium salicifolium</i> DC. (Papilionaceae)	IMPP 0034	002-Dokteri (Nyamwezi)	Root bark	Asthma	One teaspoonful of dried powdered is mixed with a cup of water and drunk 3 times a day
<i>Dioscorea dumetorum</i> Pax (Discoreaceae)	IMPP 0152	002- Sindano/Mdiga (Sukuma/Nyamwezi)	Tubers	Psychosis [Bevan et al., 1956; Schlag et al., 1959]	Dried tubers are powdered, boiled with water, and extract taken ½ a cup once a day.
<i>Diospyros zombensis</i> (BL Burt) F. White (Ebenaceae)	IMPP 0134	002-Mshinde (Nyamwezi)	Stem bark	Stroke, paralysis and psychosis [Gessler et al., 1994]	Mixed with <i>Lonchocarpus capassa</i> , powdered and boiled with water. One cup administered 3 times a day for 3-4 days.
<i>Ekebergia benguelensis</i> Welw.ex.DC (Meliaceae)	IMPP 0029	002-Mtuzya (Nyamwezi)	Whole root.	Epilepsy and lower abdominal pain	Boiled with water and 1 cup taken three times a day. It is mixed with two other plants, Mwage and Mutanga, which were not identified
<i>Entada abyssinica</i> A. Rich. (Mimosaceae)	IMPP 0101	002-Mfutwamvula (Nyamwezi)	Roots	Epilepsy [Mathias, 1982], diabetes schistosomiasis,	Mixed with <i>Pterocarpus tinctorius</i> ., Soaked in water or boiled. Children are given a tablespoonful; adults half a cup three times a day for 7 days.
<i>Erythrina abyssinica</i> DC. (Papilionaceae)	IMPP 0154 and 002-0023	002- Mlinzi/mkalankuwa (Nyamwezi)	Stem bark	Schistosomiasis, Yellow fever [Vlitinck et al., 1995]	Powdered and soaked with cold water. One cup of extract is taken three times a day for 3 days.
<i>Euclea natalensis</i> A.DC.(Ebenaceae)	IMPP 0093	002-Msaguneda (Nyamwezi)	Roots/Stem	Malaria/Yellow fever [Arnold and Gulumian, 1984]	Fresh barks boiled with water and one teaspoonful taken three times a day.
<i>Euphorbia grantii</i> Oliv. (Euphorbiaceae)	IMPP 0069	002-Mdulansongo (Nyamwezi)	Roots	Psychosis	Dried powdered powder sniffed twice a day
<i>Euphorbia tirucalli</i> L. (Euphorbiaceae)	IMPP 0111	002-Mnyaa/Mnyala (Nyamwezi)	Roots	Bilharziasis [Jurberg et al., 1985]	Mixed with <i>Azelia quanzensis</i> and <i>Sansevieria conspicua</i> .
<i>Ficus fischeri</i> Mildbr. & Burr. (Moraceae)	IMPP 0141	002-Mvila (Nyamwezi)	Stem bark	Diabetes, stroke, paralysis	The powder can be taken with porridge or boiled with water and taken (one cup) three times a day.
<i>Flacourtia indica</i> (Burm. f.) Merrill (Flacourtiaceae)	IMPP 0092	002-Mpuguswa (Nyamwezi)	Roots	Malaria [Ramachandran and Nair, 1981]	Fresh roots are extracted with either cold or hot water and one cup taken three times a day.
<i>Grewia bicolor</i> Juss (Tilliaceae)	IMPP 0086	002-Mkoma (Nyamwezi)	Roots	Epilepsy	Dried powdered 1 tea spoon in a cup of water twice daily
<i>Hexalobus monopetalus</i> (A. Rich.) Engl. & Diels. (Annonaceae)	IMPP 0068	002-Mkuwa (Nyamwezi)	Roots	Stroke	Fresh roots are sliced soaked in water and drunk
<i>Holarrhena febrifuga</i> Klotz (Apocynaceae)	IMPP 0128	002- Msongalukuga (Nyamwezi)	Leaves	Skin diseases [Sawhney et al., 1978b), bilharzias, gonorrhoea	Mixed with <i>Xerroderis stuhlmannii</i> ; powdered and taken with porridge; three times a day for 6 days.
<i>Hymenodictyon parvifolium</i> Oliv. (Rubiaceae)	IMPP 0113	002-Mjunguji/Njunguji (Nyamwezi)	Stem bark	Epilepsy [Mathias, 1982]	Dried powder boiled with water and 2 spoonfuls taken three times a day for 2-4 weeks.

<i>Indigofera microcarpa</i> Desv. (Papilionaceae)	IMPP 002-0175	Kivimbele	Leaves	Syphilis [Chiapeta et al., 1983]	Fresh leaves are boiled with water and administered orally three times a day for 5 days.
<i>Isobertinia angolensis</i> (Benth.)Hoyle & Brenan (Leguminosae)	IMPP 0168	002-Mnemela/Mlembele (Kiha)	Roots	Hypertension, Psychosis, Epilepsy	Fried, powdered and 1 table spoonful taken orally three times a day.
<i>Lannea schimperi</i> (Hochst. ex A. Rich.) Engl. (Anacardiaceae)	IMPP 0044	002-Mgumbu (Nyamwezi)	Roots Stem bark	Epilepsy malaria	Dried and extracted in hot water. One cup is taken three times a day for 3 weeks
<i>Lonchocarpus capassa</i> Rolfe (Papilionaceae)	IMPP 0135	002-Mvale (Nyamwezi)	Stem bark	Cancerous wound	Mixed with <i>Diospyros zombensis</i> and <i>Xeroderis stuhlmannii</i> or <i>Ficus fischeri</i> ; powdered and boiled and one cup taken 3-4 times a day. The powder can alternatively be taken with porridge.
<i>Maranthes floribunda</i> (Bak) F. White (Chrysobalanaceae)	IMPP 0137	002-Msundwi (Nyamwezi)	Roots	Malaria, psychosis, epilepsy.	Mixed with warm water or porridge and taken 2-3 times a day.
<i>Margaritaria discoides</i> (Baill.) Webster (Euphorbiaceae)	IMPP 0145	002-Mpasuajabali (Nyamwezi)	Roots	Epilepsy	One kg of dried powder is boiled with 1 liter of water. One table spoonful of decoction is taken three times a day.
<i>Neurotaenia mitis</i> (A.Rich) Verd (Leguminosae)	IMPP 0178	002-Vumangizi (Nyamwezi)	Roots	Asthma,oral thrush,stomatitis	Burnt to ashes and 1 table spoonful mixed with salt. A pinch is taken orally three times a day for 5 days.
<i>Omorcarpum trichocarpum</i> (Leguminosae)	IMPP 0106	002-Mlalamburi/Mkondwamhuli (Nyamwezi)	Roots	Stroke paralysis,bone setting and Bilharzia	Dried roots are powdered and applied locally for bone setting. Boiled with water and one cup taken once a day for bilharziasis.
<i>Passiflora suberosa</i> L. (Passifloraceae)	IMPP 0026	002-Mkuluwanti(Nyamwezi)	Roots	Malaria	Fresh roots are crushed and mixed with <i>Chenopodium ambrosioides</i> ; 3 table spoonfuls are boiled with two cups of water. Three teaspoonfuls are taken 3 times a day for 4 days.
<i>Pericopsis angolensis</i> (Baker)van Meeuwen (Papilionaceae)	IMPP 0110	002-Mbanga (Nyamwezi)	Stem bark	Cancer	Applied with oil or water as a paste to the wound.
<i>Phyllanthus engleri</i> Pax. (Euphorbiaceae)	IMPP 0129	002-Mgogondi (Nyamwezi)	Roots	Epilepsy	Powdered, and extracted with cold water. One cup is taken 3 times a day for 7 days.
<i>Pseudolachnostylis maproneufolia</i> Pax. (Euphorbiaceae)	IMPP 0169	002-Mtunguluwanganga (Nyamwezi)	Roots	Epilepsy, psychosis, constipation, scrotal hernia.	Powder fried and one tea spoonful given 3 times a day.
<i>Psorospermum febrifugum</i> Spach (Guttiferae)	IMPP 002-0052	Msaruhunda (Nyamwezi)	Roots	Cancerous wounds [Abou-shoer et al., 1988]	The roots are powdered and applied on the wound three times a day.

<i>Pterocarpus tinctorius</i> Welw. (Papilionaceae)	IMPP 002-0001	Mkulungu (Nyamwezi)	Root bark	Asthma	Dried, powdered, and sniffed three times a day for two weeks.
	IMPP 002-0036				
<i>Rothmannia engleriana</i> (K. Schum.) Keay. (Rubiaceae)	IMPP 0144	002-Kilindilamgunda (Nyamwezi) Mkondokondo (Nyamwezi)	Leaves/Root bark	Cancer, fractures	Dry powder is mixed with cow fat and applied to the affected area/wound.
	IMPP 0045	002-			
<i>Sansevieria conspicua</i> Br. NE (Agavaceae)	NEIMPP 0104	002-Gubu (Nyamwezi)	Roots	Bilharziasis	Fresh roots may be boiled with water and taken alone or mixed with <i>Azelia quanzensis</i> , and <i>Hymenodictyon parvifolium</i> and sorghum and a cup taken for 5 days.
<i>Sterculia africana</i> (Lour.) Fiori (Sterculiaceae)	IMPP 0094	002-Mhoja (Nyamwezi)	Aerial part	Stroke/Paralysis	Powdered dry material is administered three times a day either as decoction after boiling with water or it is taken with food three times a day.
<i>Strophanthus eminii</i> Asch. & Pax ex Pax (Apocynaceae)	IMPP 0013/002-0096	002- Ifumya (Nyamwezi)	Roots	Epilepsy, Malaria	The roots are powdered, and the powder administered by sniffing.
<i>Strychnos pungens</i> Soler (Loganiaceae)	IMPP 0170	002-Handaki/Mkome (Nyamwezi)	Roots	Psychosis	One tablespoonful of root powder is boiled with other plants and one cup taken 3 times a day.
<i>Tephrosia pumila</i> (Lam.) Pers. (Fabaceae)	IMPP 0167	002-Mshilishili (Nyamwezi)	Whole plant	Stroke	Whole plant burnt and ashes used for massaging after wetting with water.
<i>Terminalia kaiserana</i> F. Hoffm. (Combretaceae)	IMPP 0048	002-Mzima (Nyamwezi)	Roots	HIV/AIDS, diarrhea	Powdered and one table spoonful of the powder taken with a cup of cold water three times a day for two days.
				[Fyhrquist et al., 2002;2004]	
<i>Tragia fuliaris</i> Boj. (Euphorbiaceae)	IMPP 00126/002-0071	002- Mpugambu/Kaboroja (Nyamwezi)	Roots	Malaria, aphrodisiac, paralysis	Extracted with cold water and one cup taken three times a day for three days.
<i>Vepris glomerata</i> (F.Hoffm)Engl. (Rutaceae)	IMPP 0042	002-Mlungusikiti (Nyamwezi)	Roots	Psychosi, malaria, epilepsy, stroke	Powdered and extracted with cold water or mixed with tea and drunk thrice a day for 3 days.
<i>Withania somnifera</i> (L)Dunal (Solanaceae)	IMPP 0115	002-Mkubya (Nyamwezi)	Roots	Diabetes [Ali et al., 1997; Prakash et al., 2002]	The fresh roots are boiled with water and one cup taken twice a day.
<i>Xeroderis stuhlmannii</i> (Taub.) Mend. & Souza. (Leguminosae)	IMPP 0140	002-Mnyenye/ Muvelewele (Nyamwezi)	Stem-bark	Bilharzia, Gonorrhoea	One gram of a mixture of <i>Xeroderis stuhlmannii</i> and <i>Cassia abbreviata</i> roots are powdered and mixed with the plant. Powder is boiled with 1 litre of water, cooled and 1 glass of decoction taken orally 4 times a day for 1-3 days.
<i>Xylopia arenaria</i> Engl. (Annonaceae)	IMPP 0005	002-Mshenene (Nyamwezi)	Roots	Menstrual disorders	Dried, powdered, extracted with water and ½ glass taken 3 times a day for 7 days.
<i>Xylopia odoratissima</i> Welw. ex Oliv. (Annonaceae)	IMPP 0002	002-Mshenene (Nyamwezi)	Roots	Asthma	Dried fresh roots are powdered, then extracted with water and ½ a cup taken orally three times a day for two weeks

Results

Evaluation of the therapeutic claims based on the literature.

Using a symptom guided interview, plants that are used to treat or manage bronchial asthma, diabetes mellitus, epilepsy, psychosis, malaria, bacterial infections, fungal infections, impotence, HIV/AIDS, bilharzia, cancer, yellow fever, skin conditions, and hypertension were identified (Table 1). Literature based evaluation of the claimed uses (Table 1, column 5) agree with 35% of the claims, which included uses of *Boscia salicifolia* Oliv (Capparidaceae) for the treatment of impotence (Haerdi, 1964), *Combretum molle* G.Don (Combretaceae) (Asres et al., 2001), and *Cassia abbreviata* Oliv (Caesalpiniaceae) (Khan et al., 1980; Connely et al., 1996) for the treatment of malaria, and *Discorea dumetorum* Pax (Discoreaceae) for treatment of mental disorders (Bevan et al., 1956; Schlag et al., 1959).

The Brine shrimps lethality test

The plants exhibited varying degrees of toxicity against brine shrimp larvae, with some having very low and some very high toxicity (Table 2). Six out of the 60 plants (10%) gave LC₅₀ values greater than 100µg/ml, 21(35.0%) plants gave LC₅₀ values between 51-100µg/ml, 23 (38.3%) plants gave LC₅₀ values between 20-50µg/ml, and 10 (16.7%) plants gave LC₅₀ values below 20µg/ml. *Afzelia quanzensis* (LC₅₀ 2.95µg/ml), *Dalbergia melanoxylon* (LC₅₀ 8.64µg/ml), *Ekebergia benguelensis* (LC₅₀ 2.14µg/ml), *Euclea natalensis* (LC₅₀ 19.33µg/ml), *Lonchocarpus capassa* (LC₅₀ 17.79µg/ml), *Psorospermum febrifugum* (LC₅₀ 12.69µg/ml), *Phyllanthus engleri* (LC₅₀ 0.46µg/ml), *Neurotaenia mitis* (LC₅₀ 0.34 µg/ml), *Sansevieria conspicua* (LC₅₀ 13.98µg/ml), and *Terminalia kaiserana* (LC₅₀ 15.74µg/ml) were the most toxic extracts to the brine shrimps. Cyclophosphamide, a standard anticancer drug, gave an LC₅₀ value of 16.30µg/ml.

Discussion

Approximately 35% of plants used by traditional healers in Tabora were, on the basis of literature, supported to have therapeutic value. This figure is consistent with data that have been reported previously for diseases like diabetes mellitus and epilepsy (Moshi and Mbwambo, 2002; Moshi et al., 2005). The results confirmed the supportive role of traditional healers in offering health care services to local communities. The majority of areas in Tabora region are remote and, therefore, likely that its people would depend on the service offered by traditional healers. The claims on *Psorospermum febrifugum* have a special merit. The plant is used for the treatment of cancerous wounds, which agreed with results of tests carried out using cancer cell lines and the subsequent isolation of an active compound (Abou-shoer et. al., 1988). This was supported by brine shrimp results which are sometimes used to predict anticancer activity (Meyer et al., 1982). Despite the low predictive capability of brine shrimp assay results, there was a remote possibility that some other plants in this study might have anticancer activity. The 10 plants (Table 2) which exhibited high toxicity with LC₅₀ values below 20µg/ml were likely candidates. The results may suggest that some of these plants are toxic. This was true for *Phyllanthus engleri*,

Table 2: The brine shrimp lethality results represented as LC₅₀ in µg/ml and 95% confidence intervals (CI).

Name of plant	LC₅₀ (µg/ml)	95% CI
<i>Acacia amythethophylla</i>	22.4	15.2-32.9
<i>Afzelia quanzensis</i>	2.95	1.4-6.1
<i>Albizia harveyi</i>	65.84	45.10-96.13
<i>Asparagus flagellaris</i>	45.59	30.91-67.25
<i>Borassus aethiopum</i>	95.42	65.27-139.51
<i>Boscia salicifolia</i>	22.8	14.7-35.3
<i>Bridelia duvigneaudii</i>	26.61	17.243-38.025
<i>Burkea africana</i>	87.24	60.17-126.50
<i>Cadaba farinosa</i>	122.97	78.33-193.67
<i>Cassia abbreviata</i>	39.6	27.3-57.6
<i>Catunaregam spinosa</i>	65.4	42.743-100.057
<i>Chrysophyllum bangweolense</i>	96.3	65.5-141.6
<i>Ciccus cornifolia</i>	80.38	56.053-115.265
<i>Clerodendron uncinata</i>	41.9	27.93-62.85
<i>Combretum molle</i>	49.21	33.71-71.85
<i>Dalbergia melanoxyton</i>	8.6	5.1-14.7
<i>Desmodium salicifolium</i>	33.1	23.5-46.7
<i>Diospyros zombensis</i>	43.06	30.30-61.19
<i>Discorea dumetorum</i>	190.53	141.87-255.88
<i>Ekebergia benguelensis</i>	2.14	1.624-3.909
<i>Entada abyssinica</i>	22.7	14.9-34.5
<i>Erythrina abyssinica</i>	90.5	62.5-130.9
<i>Euclea natalensis</i>	19.33	10.74-34.79
<i>Euphorbia grantii</i>	110.7	74.2-165.1
<i>Euphorbia tirucalli</i>	98.27	65.96-147.43
<i>Ficus fischeri</i>	357.8	194.6-658.0
<i>Flacourtia indica</i>	27.4	17.9-42.1
<i>Grewia bicolor</i>	56.82	39.32-82.17
<i>Hexalobus monopetalus</i>	36.07	26.04-49.95
<i>Holarrhena febrifuga</i>	37.7	28.4-50.1
<i>Hymenodityon parvifolium</i>	21.1	13.0-34.0
<i>Indigofera microcarpa</i>	158.8	110.8-227.7
<i>Isoberlinia angolensis</i>	88.95	55.18-143.39
<i>Lannea schimperi</i>	110.8	67.2-182.7
<i>Lonchocarpus capassa</i>	17.8	12.1-26.3
<i>Maranthes floribunda</i>	41.8	26.7-65.4
<i>Margaritaria discoides</i>	88.88	57.35-137.77
<i>Neurotaenia mitis</i>	0.34	0.212-0.542
<i>Ormocarpum trichocarpum</i>	72.13	48.51-107.25
<i>Passiflora suberosa</i>	79.49	50.31-125.59
<i>Pericopsis angolensis</i>	33.1	23.4-46.7
<i>Phyllanthus engleri</i>	0.47	0.31-0.71

<i>Pseudolachnostylis maproneufolia</i>	22.4	15.5-32.4
<i>Psorospermum febrifugum</i>	12.7	8.1-19.8
<i>Pterocarpus tinctorius</i>	48.1	35.1-65.7
<i>Rothmania englerana</i>	81.34	57.69-114.69
<i>Sansevieria conspicua</i>	13.9	8.7-22.5
<i>Sclerocarya birrea</i>	51.1	38.0-68.6
<i>Sterculia africana</i>	94.5	57.9-154.9
<i>Strophanthus eminii</i>	38.92	27.43-55.23
<i>Strychnos pungens</i>	44.59	31.45-63.23
<i>Tephrosia pumila</i>	40.6	28.9-56.9
<i>Terminalia kaiserana</i>	15.7	10.2-24.2
<i>Tragia fuliaris</i>	62.7	44.0-89.2
<i>Vepris glomerata</i>	51.05	37.79-68.97
<i>Withania somnifera</i>	71.16	48.74-103.89
<i>Xeroderis stuhlmannii</i>	59.58	43.30-81.98
<i>Xylopiya arenaria</i>	46.8	34.6-63.2
<i>Xylopiya odoratissima</i>	35.25	24.82-50.06
Cyclophosphamide	16.3	10.6-25.2

which was reported to be toxic to fish (Breyer Brandwijk, 1934), and rabbits (Watt and BreyerBrandwijk, 1929; BreyerBrandwijk, 1934). While some of the therapeutic claims have been supported by literature reports, and some by brine shrimp assay results, more rigorous studies are needed to confirm the therapeutic utility of the plants.

Conclusion

Literature reports have supported the therapeutic claims of some plants that are used in traditional medicine, thus supporting the ethnomedical method as a viable tool for drug discovery. However, while brine shrimps assay results have supported a few of the claims, they remain inconclusive and hence the need for more rigorous studies to confirm the therapeutic utility of the plants.

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