

Ethnobotany of Medicinal Plants used to Treat Various Mental illnesses in Ethiopia: A Systematic Review

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ABSTRACT

Background: Mental health is a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community. No review has been done that comprehensively expresses medicinal plants used to treat various mental illnesses. The aim of this review was to provide an overview of the Ethnobotany of medicinal plants used to treat mental illnesses in Ethiopia.

Materials and methods: Databases (PubMed, Google Scholar, ResearchGate and Hinari) were searched for published studies on the Ethnobotany of medicinal plants used to treat mental illnesses in Ethiopia without restriction in the year of publication or methodology. Some studies were also identified through manual Google search. Primary search terms were “mental illness”, “Ethiopia”, “medicinal plant”, “ethnobotany”, “epilepsy”, “evil eye”, “depression”, “schizophrenia” and “psychosis”. Studies that did not contain full ethnobotanical data of medicinal plants were excluded.

Results: The database search produced a total of 233 papers. After adjustment for duplicates and inclusion and exclusion criteria, 59 studies were found suitable for the review. Most studies were qualitative in nature. A total of one hundred fifty four medicinal plants have been identified and recorded for their use in management of various mental illnesses in Ethiopia. Families, Fabaceae and Asteraceae each account 18 (11.7%) and 17 (11%) respectively. Of the plants identified from the various studies, the common plant part used was root (41%) while majority of the plant remedies were given inhalationally (45%).

Conclusion: Herbs and shrubs constitute majority of the plants while the commonly used plant part was root. While traditionally treating mental illnesses, most practitioners prefer inhalational route of administration. Though most of these medicinal plants are widely utilized in different parts of the country, safety and efficacy information of them are not scientifically tested in animals. Thus, it is relevant for researchers in the field to conduct the safety and efficacy study of the traditionally claimed medicinal plants.

Keywords: Epilepsy, Ethnobotany, Medicinal plants, Mental illness, Review

Abbreviations: LN: Local Name; A: Aari; M: Maale; B: Benigna; Be: Bench Maji; Ku: Kunama; Amh: Amharic; D: Dawurogna; G: Gumuz; O: Oromifa; T: Tigrigna; Nm: Not Mentioned; K: konta; S: Somaligna; Af: Afarigna; H: Hamer; Si: Sidamgna; PU: Parts Used, MP: Method of Preparation, RA: Route of Administration

INTRODUCTION

Mental health is a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community [1].

In speaking of a person's mental health, it is advisable to distinguish between attributes and actions. The individual may be classified as more or less healthy in a long-term view of his behavior or, in other words, according to his enduring attributes. Standards of mentally healthy or normal, behavior vary with the time, place, culture, and expectations of the social group. In short, different peoples have different standards. Mental health is one of many human values; it should not be regarded as the ultimate good in itself [2].

About eighty percent of the Ethiopia people and ninety percent of livestock depend on traditional medicine for their health care and more than 95 percent of traditional medicine preparations are made from plant origin. Similarly, there has been a continuous growth of demand for herbal medicines globally and in many developing countries health care [3].

Even though different studies have been conducted on ethnobotany of medicinal plants used to treat various human diseases in different parts of Ethiopia, there has not been any review done that comprehensively expresses the ethnobotany of those plants used to alleviate mental illnesses. Therefore, there is a need to assess the overall traditional preparation techniques and types of plants used in the country. The objective of this review was to provide an overview of ethnobotany of medicinal plants used to treat mental illnesses among the Ethiopian population. It gives a comprehensive information on the name of plants, method of preparation, route of administration, plant part used and the habit of the plant used as well as the specific mental illness type traditionally treated [4-6].

MATERIALS AND METHODS

Search strategy

Databases (PubMed, Google Scholar, ResearchGate and Hinari) were searched for published studies done on ethnobotany of medicinal plants in Ethiopia. Some studies were also identified through a manual Google search. Additional articles were also searched from the reference lists of retrieved articles. No restriction was applied on the year of publication, methodology, or study subjects. Primary search terms were “mental illness”, “Ethiopia”, “medicinal plant”, “ethnobotany”, “epilepsy”, “evil eye”, “depression”, “schizophrenia” and “psychosis”.

Inclusion/exclusion criterion

Those studies which do not contain complete ethnobotanical data and surveys which did not address one or more mental illness types as a disease treated by the practitioners as well as studies which incorporate only medicinal plants of veterinary usage are excluded from this review. Research articles which did not contain full ethnobotanical data of medicinal plants used to treat mental illnesses were also excluded. Medicinal plants were checked for their presence in the flora of Ethiopia and Eritrea [5] and those which are not listed in the flora were not included in the review.

Data abstraction

The authors screened the articles based on the inclusion/exclusion criteria. The following details of medicinal plants were extracted from each study using an abstraction form: scientific and local name, habit and plant parts used, methods of preparation and route of administration as well as the mental illness type.

RESULTS

Literature search results

The search of the PubMed, Google Scholar, ResearchGate and Hinari databases and Google provided a total of 233 studies. After adjustment for duplicates, 130 remained. Of these, 42 studies were discarded, since after review of their titles and abstracts, they did not meet the criteria. An additional five studies that met the criteria for inclusion were

identified through searching the reference lists of retrieved papers. The full texts of the 93 studies were reviewed in detail. Thirty four studies were discarded after the full text had been reviewed, since they did not address much of the needed information. Finally, as shown in Figure 1, 59 studies were included in the review.

Study characteristics

Methodological validity of all the 59 studies was checked prior to inclusion in the review by undertaking critical appraisal using a standardized instrument adapted from Guyatt et al. [6]. The 59 studies differed substantially in the number of plants identified. From these 59 articles, the majority were conducted to assess the ethnobotany of medicinal plants used to treat human diseases, while forty studies focused on ethnobotany of medicinal plants used in the management of both human and animal disorders. The studies were conducted in different parts of the country. Most of the studies were qualitative in nature. These studies used purposive sampling to select study subjects. Detailed description of individual plants gathered from different studies is provided in Table 1.

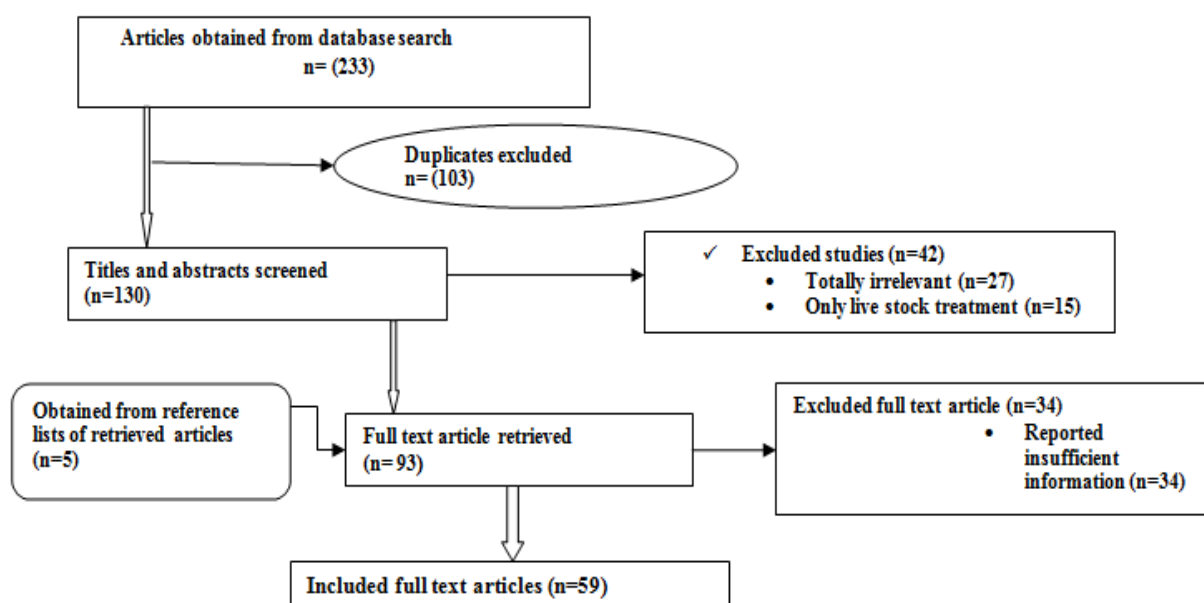


Figure 1: Flow diagram of study selection

Table 1: List of medicinal plants used for management of mental illnesses [2-5,7-19,21-24,26,27,45-81]

S. No.	Scientific Name with family name in parenthesis	LN	Habit	PU	MP	RA	Mental illness type	Reference(s)
1	<i>Croton schimperianus</i> Muell. Arg. (Euphorbiaceae)	Makafta (O)	Herb	Root	Crushing	Topical	Evil spirit	[78]
2	<i>Kanahialaniflora</i> (Forssk.) R. Br. (Asclepiadaceae)	Jidda ananii (O)	Herb	Root, leaf	Crushing	Topical	Evil eye	
3	<i>Gomphocarpus integer</i> (N. E. Br.) Bullock (Asclepiadaceae)	Hormalaa (O)	Herb	Root, stem	Powdering	Inhalational	evil eye	
4	<i>Dorstenia barnimiana</i> Schweinf. (Moraceae)	Werk Bemieda (Amh)	Herb	Root	Root powder is mixed with aguat and filtrate taken in empty stomach	Oral	Evil spirit, Schizophrenia	[2]

5	<i>Withania somnifera</i> (L.) (Solanaceae)	Gizawa (Amh)	Herb	Root	Root powder mix with root powder of KEBERICHO (Echinops kebericho) and smoking in a house who delivered baby	Inhalational	Evil eye	[3,4,13,21,45]
				Root	crushed with garlic, squeezed droplets and tied with a piece of cloth and smelling	Inhalational	Evil eye	[79]
				Root	Root will be crushed and smoke inhaled	Inhalational	Evil eye	[67]
				Root	The smoke of the root inhaled	Inhalational	Insomnia	[77]
				Whole plant	Crush by mixing with roots of <i>Carissa spinarum</i> and put it on for fumigation	Inhalational	Evil spirit	[16,46,63,66]
5	<i>Withania somnifera</i> (L.) (Solanaceae)	Gizawa (Amh)	Herb	Leaf	The leaves of <i>Withania somnifera</i> with leaves of <i>Artemisia abyssinica</i> , <i>Vernonia amygdalina</i> , <i>Ruta chalepensis</i> , <i>Allium sativum</i> bulb and the seed of <i>Lepidium sativum</i> with root of <i>Carissa spinarum</i> are finely crushed together and sniffed at the sickness time	Inhalational	Evil eye	[74]
				Leaf	Squeezed with leaves of <i>Ruta chalepensis</i> and drunk 1 soup spoon	Oral	Evil eye	[17]
9	<i>Cissus quadrangularis</i> L. (Vitaceae)	Bararo (M)	Climber	Leaf	Tied under belly	Topical	Evil eye	[47]
10	<i>Gloriosa superba</i> L. (Colchicaceae)	Harmel Kubra(O)	Shrub	Leaf	Crushed leaf filtrate taken oral	Oral	Epilepsy	[4]
11	<i>Gomphocarpus purpurascens</i> A. Rich. (Asclepiadaceae)	Ari-Yuyo(O)	Herb	Leaf	A cup of Infusion taken oral & smoke bath with dry leaf	Topical	Evil eye	
12	<i>Allium sativum</i> L. (Alliaceae)	Nech Shinkurt (Amh)	Herb	Seed	Crushing the seed with seeds of <i>Lepidium sativum</i> L. and <i>Ruta chalepensis</i> L. and inhale it	Inhalational	Evil eye	[7,9,12, 14,24,26,65]
				Root	grinding the roots of <i>Carisa spinarum</i> , <i>Phytolacca dodecandra</i> L' Herit, <i>Capparis tomentosa</i> , <i>Securidaca longepedunculata</i> , <i>Boscia angustifolia</i> , <i>Ruta chalepensis</i> L., <i>Sida schimperiana</i> and <i>Croton macrostachyus</i> , then inhaling	Inhalational		

13	<i>Brucea antidysenterica</i> J.F.Mill. (Simaroubaceae)	Abalo (Amh)	Shrub	Root	Crushing its root with the roots of <i>Pterolobium stellatum</i> (Forssk.) Brenan, <i>Carissa spinarum</i> L. and <i>Clausena anisata</i> (Wild) Benth. and inhale it	Inhalational	Evil eye	[7,81]
					The dry root is smoked & inhaled	Inhalational	Evil eye	[23]
				Root, leaf	Bathing with crushed fresh leaves and root	Topical	Psychosis	[10]
				Flower	The flower is pounded boiled and fumigated	Inhalational	Evil eye	[25]
14	<i>Carissa spinarum</i> L. (Apocynaceae)	Agam (Amh)	Shrub	Root	Crushing the root with the fruit of garlic and the fruit of <i>Ruta chalepensis</i> L., finally inhale it Root powdered and dispersed on fires to fumigate the smoke	Inhalational	Evil eye	[7,10,12,14,26,27,45,46,51,59,70,72,80]
					Fumigating the smoke of dry root	Inhalational	Evil eye	[23]
					The root is crushed with bulbs of garlic, squeezed in water and droplets are taken through the nose and the remaining parts tied with clothes and smelling	Inhalational	Evil eye	[79]
					The smoke of the root is inhaled/the root ground and the body bathed to avoid relapse	Inhalational, topical	Evil spirit	[77]
					Roots are crushed with garlic and squeezed with water and one cup is taken (crushing and squeezing)	Oral	Evil eye, devil Sickness	[8]
15	<i>Clausena anisata</i> (Wild) Benth. (Rutaceae)	Limch (Amh)	Shrub	Whole plant	The juice of whole plant is employed for bathing	Topical	Exorcism	[7]
				Root	Sniff, drink and fumigate	Inhalational, oral	Evil eye	[26]
15	<i>Cordial africana</i> Lam. (Boraginaceae)	Wanza (Amh)	Tree	Leaf	Powder of the semi-parasite worn as amulet against startling dreams	Topical	Nightmare	[7]
16	<i>Echinops kebericho</i> Mesfin (Asteraceae)	Kebericho (Amh)	Shrub	Stem	Drying, crushing and adding the seed on fire to smell	Inhalational		[7,18,48]
				Root	Root together with dried root of <i>Silene macroselen</i> , is smoked to the patient	Inhalational	Evil eye	[24]
					Root powder is sprinkled on burning charcoal and smoke is inhaled	Inhalational		[10,53,63]
17	<i>Ficus vasta</i> Forssk. (Moraceae)	Shoal (Amh)	Tree	Bark	Fumigate the patient once daily with the smoke of the powder of bark	Inhalational	Epilepsy	[7]

18	<i>Ruta chalepensis</i> L. (Rutaceae)	Tenadam (Amh)	Shrub	Seed, leaf	Crushing the seed with the seeds of garlic and apply it on the nostril	Inhalational	Evil eye	[7,9,14,18,53,66]
				Leaf	Smelling aroma of fresh leaf and stem	Inhalational	Evil eye	[10,12,62]
					Squeezed, added to syringe up to 1 cc and added drop by drop on the left ear for 40 days.	Auricular	Epilepsy	[17]
					The leaf of <i>Ruta chalepensis</i> with root of <i>Verbascum sinaiticum</i> , <i>Capparis tomentosa</i> , <i>Ximena americana</i> , <i>Rhus natalensis</i> and the bulb of <i>Allium sativum</i> are crushed, powdered, mixed with little amount of water and sniffed by holding with clean cloth	Inhalational	Evil eye	[74]
					Fresh leaf together with leaf of <i>Datura stramonium</i> is rubbed on the body of the patient or wash with the solution of these plants	Topical	Evil eye	[24]
					Fresh leaves are mixed with coffee and drunk	Oral	Evil eye	[21]
					The leaves are boiled with water and drunk	Oral	Evil spirit	[65]
19	<i>Solanum incanum</i> L. (Solanaceae)	Embuay (Amh)	Shrub	Seed	Powder of seed given in small amount through the nose to help a child to be a fast learner and intelligent	Inhalational	Attention deficient disorder	[7,9]
				Apex	Young shoots (without branch), combined with: Mrenz root (<i>Acokanthera schimperi</i>)	Oral	Psychosis	[11,51]
20	<i>Dioscorea alata</i> L. (Dioscoreaceae)	Boka(G)	climber	Root	Fumigates of root either fresh or dry condition (fumigates)	Inhalational	Devil sickness	[8]
21	<i>Tecoma stans</i> (L.) Juss (Bignoniaceae)	Odnjo (G)	Tree	Root	Root is crushed, diluted in water and one cup is taken (diluting)	Oral	Evil eye	
22	<i>Boscia angustifolia</i> A. Rich (Capparidaceae)	Kermed (Amh)	Tree	Root	Grinding the roots of <i>Carisa spinarum</i> , <i>Phytolacca dodecandra</i> , <i>Capparis tomentosa</i> , <i>Securidaca longepedunculata</i> , <i>Boscia angustifolia</i> , <i>Ruta chalepensis</i> , <i>Sida schimperiana</i> and <i>Croton macrostachyus</i> , then inhaling; additionally bandage	Inhalational, topical	Evil eye	[9,55]
				Stem	Cut the stem part and tie in the neck	Topical	Evil spirit	[62]
				Leaf	The leaf of <i>Boscia angustifolia</i> is pounded and immersed in the water and washed seven days every morning	Topical	Evil spirit	[68]

23	<i>Capparis tomentosa</i> Lam. (Capparidaceae)	Gumero (Amh)	Shrub	Root	The root is crashed with <i>Sativum alium</i> , <i>Achyranthes aspera</i> , Temena, <i>Ziziphus abyssinica</i> , <i>Ali gua gua</i> , <i>Ruta chalepensis</i> , <i>Carisa edulis</i> , <i>Clematis simensis</i> , <i>Withania somnifera</i> , <i>Cucumis ficifolius</i> and <i>Capparis tomentosa</i> then bandage it	Topical	Evil eye	[5,9,26, 27,51]
					The root of croton macrostachyus is grinded with the roots of <i>Capparis tomentosa</i> , <i>Vernonia adoensis</i> , <i>Pterolobium stellatum</i> and <i>Carisa spinarum</i> , then drinking 1 cup decoction	Oral	Evil eye	[9]
					grinding the roots of <i>Carisa spinarum</i> , <i>Phytolacca dodecandra</i> , <i>Capparis tomentosa</i> , <i>Securidaca longepedunculata</i> , <i>Boscia angustifolia</i> , <i>Ruta chalepensis</i> , <i>Sida schimperiana</i> and <i>Croton macrostachyus</i> , then inhaling; additionally bandage	Inhalational, topical	Evil eye	[12,14,27]
					Its root with leaves of <i>Withania somnifera</i> crushed together, powdered, tied with the clean bandage or sniffed during sickness time	Inhalational, topical	Evil eye	[74]
					Leaf or root is crushed, add to fire and smoked to the victim	Inhalational	Evil eye	[24]
					Tying with a piece of cloth around the neck or put in pocket	Topical	Evil eye	[23]
				Leaf	Leaf of <i>Capparis tomentosa</i> and <i>Ruta chalepensis</i> are pounded and mixed in water together and one domestic alcohol cup is used as a drink	Oral	Evil eye	[69]

24	<i>Croton macrostachyus</i> Hochst. Ex. Del. (Euphorbiaceae)	Bisana (Amh)	Tree	Root	The root of croton macrostachyus is grinded with the roots of <i>Capparis tomentosa</i> , <i>Vernonia adoensis</i> , <i>Pterolobium stellatum</i> and <i>Carisa spinarum</i> then drinking 1 cup decoction It is crushed alone or with root of <i>Cyphostemma adenocaula</i> and <i>String hermonthica</i>	Oral	Evil eye	[9]
					Topical, inhalational	Evil eye, psychosis	[14,26]	
					Inhalational	Evil eye	[72]	
					Root of <i>Croton macrostachyus</i> and <i>Carissa spinarum</i> are chopped together and fumigated.	Inhalational	Evil eye	[69]
25	<i>Indigofera spicata</i> Forssk. (Fabaceae)	Yebab alenga (Amh)	Herb	Root	Grinding the roots of <i>Polygala abyssinica</i> , <i>Carisa spinarum</i> , <i>Phytolacca dodecandra</i> , <i>Capparis tomentosa</i> , <i>Securidaca longepedunculata</i> , <i>Boscia angustifolia</i> , <i>Ruta chalepensis</i> , <i>Sida schimperiana</i> and <i>Croton macrostachyus</i> , then inhaling; additionally bandage	Inhalational, topical	Evil eye	[9]
				Leaf	Leaves are chewed, juice sipped and swallowed	Oral	Evil eye	[71]
26	<i>Phytolacca dodecandra</i> L. Herit (Phytolaccaceae)	Endod	Shrub	Root	The same as grinding the roots of <i>Polygala abyssinica</i> , <i>Carisa spinarum</i> , <i>Phytolacca dodecandra</i> , <i>Capparis tomentosa</i> , <i>Securidaca longepedunculata</i> , <i>Boscia angustifolia</i> , <i>Ruta chalepensis</i> , <i>Sida schimperiana</i> and <i>Croton macrostachyus</i> , then inhaling; additionally bandage	Inhalational, topical	Evil eye	[9]
27	<i>Polygala abyssinica</i> Fres. (Polygalaceae)	Este Libona (Amh)	Herb	Root	grinding the roots of <i>Polygala abyssinica</i> , <i>Carisa spinarum</i> , <i>Phytolacca dodecandra</i> , <i>Capparis tomentosa</i> , <i>Securidaca longepedunculata</i> , <i>Boscia angustifolia</i> , <i>Ruta chalepensis</i> , <i>Sida schimperiana</i> and <i>Croton macrostachyus</i> , then inhaling; additionally bandage	Inhalational, topical	Evil eye	[9]
				Root	Finger-sized root is chewed. Overdose may causes madness The cleaned root is chewed and absorbed	Oral Oral	Sharpen mind Aynetila	[12,51] [14]

28	<i>Securidaca longepedunculata</i> Fres. (Polygonaceae)	Temenhie (Amh)	Tree	Root	Grinding the roots of <i>Securidaca longepedunculata</i> , <i>Polygala abyssinica</i> , <i>Carisa spinarum</i> , <i>Phytolacca dodecandra</i> , <i>Capparis tomentosa</i> , <i>Polygala abyssinica</i> , <i>Boscia angustifolia</i> , <i>Ruta chalepensis</i> , <i>Sida schimperiana</i> and <i>Croton macrostachyus</i> , then inhaling; additionally bandage	Inhalational, topical	Evil eye	[9,56]
					Dried roots crushed and put on fire then the smoke sniffed	Inhalational	Evil eye	[48]
				Bark	Dried bark powdered and taken with local alcohol for 5 days	Oral	Evil eye	
29	<i>Verbasicum sinaiticum</i> Benth. (Scrophulariaceae)	Kutitina (Amh)	Herb	Root	The root of <i>Verbasicum sinaiticum</i> is grind with roots of <i>Carisa spinarum</i> , <i>Sativum alium</i> , <i>Achyranthes aspera</i> , <i>Securidaca longepedunculata</i> , <i>Ziziphus abyssinica</i> , <i>Ruta chalepensis</i> , <i>Clematis simensis</i> , <i>Withtania somnifera</i> , <i>Cucumis ficifolius</i> and <i>Capparis tomentosa</i> then bandage	Topical	Evil eye	[61]
30	<i>Vernonia adoensis</i> Sch. Bip. ex Walp. (Asteraceae)	Etse Mussie (Amh)	Shrub	Root	Its root and <i>Chatha edulis</i> leaf are crashed and prepared as decoction, then drink	Oral	Psychosis	
31	<i>Withtania somnifera</i> L. Dunal. (Solanaceae)	Gizewa (Amh)	Shrub	Root	The root of <i>Carisa spinarum</i> is grind with roots of <i>Verbasicum sinaiticum</i> , <i>Sativum alium</i> , <i>Achyranthes aspera</i> , <i>Securidaca longepedunculata</i> , <i>Ziziphus abyssinica</i> , <i>Ruta chalepensis</i> , <i>Clematis simensis</i> , <i>Withtania somnifera</i> , <i>Cucumis ficifolius</i> and <i>Capparis tomentosa</i> then bandage	Topical	Psychosis	[9,11]
32	<i>Ziziphus abyssinica</i> Hochst. ex A. Rich. (Euphorbiaceae)	Abetere (Amh)	Tree	Bark	The root of <i>Carisa spinarum</i> is grind with roots of <i>Verbasicum sinaiticum</i> , <i>Sativum alium</i> , <i>Achyranthes aspera</i> , <i>Securidaca longepedunculata</i> , <i>Ziziphus abyssinica</i> , <i>Ruta chalepensis</i> , <i>Clematis simensis</i> , <i>Withtania somnifera</i> , <i>Cucumis ficifolius</i> and <i>Capparis tomentosa</i> then bandage	Topical	Evil eye	[9]

33	<i>Dracaena steudeneri</i> Engl. (Dracaenaceae)	Etse Patos (Amh)	Tree	Root	Root is burned and smoke is inhaled	Inhalational	Evil eye	[10]
34	<i>Justicia schimperiana</i> (Hochst.ex A. Nees) <i>T. anders</i> (Acanthaceae)	Sensel (Smiza) (Amh)	Shrub	Root	Smelling the aroma of fresh root	Inhalational	Evil eye	
35	<i>Vernonia amygdalina</i> Del. (Asteraceae)	Girawa (Amh)	Shrub	Leaf	Bathing with crushed fresh leaves	Topical	Psychosis	[69]
					Crushed young twinge with leaves is sprayed in home and cattle fence	Inhalational	Evil spirit	
				Root	Root powder is sprinkled on burning charcoal and smoke is inhaled	Inhalational	Evil eye	[10,12]
36	<i>Stereospermum kunthianum</i> Cham. (Bignoniaceae)	Botoroo (O)	Tree	Bark	Dried bark put on fire and the smoke inhaled	Inhalational	Evil eye	[48,60]
37	<i>Artemisia abyssinica</i> Sch. Bip. ex. Rich (Asteraceae)	Ariti (Amh)	Herb	Root Whole plant Seed	Crushed fresh root of <i>A. abyssinica</i> is homogenized in water and the patient smell and drink	Inhalational	Psychosis	[49]
					It is kept in pocket as tooth brush; the powder is tied with others like <i>A. sativum</i> seeds are powdered and dispersed in tea and taken	Topical	Evil eye	[14]
					Oral	Evil eye	[54]	
				Leaf	Leaf concoction together with root of <i>Echinops kebericho</i> is added to a burning fire and smoked to the patient	Inhalational	Evil eye	[24]
38	<i>Albizia schimperiana</i> Oliv. (Fabaceae)	Imalaa (O)	Tree	Root	Root of <i>A. schimperiana</i> and <i>Pterolobium stellatum</i> is dried and powdered	Inhalational	Evil eye	[49]
39	<i>Ajuga integrifolia</i> Buch.-Hamn. (Lamiaceae)	Armaguusa (O)	Herb	Leaf	Leaf of <i>A. integrifolia</i> is pounded and mixed with nut oil	Oral	Epilepsy	
40	<i>Bidens pilosa</i> L. (Asteraceae)	Chogogitii/ Chogogit (O)	Herb	Root	Root with root and leaf of <i>Zehneria scabra</i> boiled and fumigate the smoke	Inhalational	Psychosis	[45]
41	<i>Clematis simensis</i> Fresen. (Ranunculaceae)	Enderifa (Amh)	Herb	Root	Root is burned and breathe in the smoke	Inhalational	evil eye	
42	<i>Guizotia scabra</i> (Vis) Chiov. (Asteraceae)	Mech (Amh)	Herb	Root	Root powdered, boiled with root powders of <i>Ajuga integerifolia</i> , <i>Foeniculum vulgare</i> and <i>Withania somnifera</i> . One cup of the concoction taken orally	Oral	Epilepsy	
43	<i>Jasminum grandiflorum</i> L. (Oleaceae)	Tembel (Amh)	Herb	Root	Root burned and draw in the smoke	Inhalational	Evil eye	[26,45]

44	<i>Juniperus procera</i> Endle (Cupressaceae)	Yehabesha Tsid (Amh)	Tree	Fruit	Fruit powder boiled with root of <i>Phytolacca dodecandra</i> and fruit powder of <i>Datura stramonium</i> ; and wash the patient for three days	Topical	Psychosis	[45]
45	<i>Verbascum sinaiticum</i> Benth. (Scrophulariaceae)	Yehya joro (Amh)	Herb	Root	Root crashed, placed in a fire and fumigating the smoke	Inhalational	Night mare	[16]
					Place it on fire with sulphur for fumigation	Inhalational	Evil eye	
46	<i>Artemisia afra</i> Jacq. ex willd. (Asteraceae)	Chena baria (T)	Herb	Leaf	Aroma of the leaves help in expelling evil eye Leaves of <i>Artemisia afar</i> and <i>Ruta chalepensis</i> and bulb of <i>Allium sativum</i> are crushed and aroma sniffed	Inhalational	Evil eye	[12,21,27,51]
					Crushed, squeezed with <i>Withania somnifera</i> and 1/4 coffee cup is given	Oral		
					Crushed and tied within a piece of cloth around neck	Topical	Evil eye	[23]
47	<i>Asparagus africanus</i> Lam. (Asparagaceae)	Kasta ansti (T)	Shrub	Root	Root of <i>Carissa spinarum</i> and leaves of <i>Ruta chalepensis</i> , <i>Artemisia afra</i> , <i>Cucumis ficifolius</i> and <i>Asparagus africanus</i> are crushed and fumigated indoor	Inhalational	Evil eye	[12,61]
					Place on fire for fumigation	Inhalational	Evil eye	[27]
48	<i>Clerodendrum myricoides</i> (Hochst.) R.Br. ex Vatke (Verbenaceae)	Surbetri (T)	Shrub	Root	Roots are pounded into powder and sprinkled on fire to expel evil eye	Inhalational	Evil eye Evil spirit	[12,16, 17 51,55,61]
				Stem	To brush the teeth	Topical		
				Root	Root is inserted on fire and the smoke is inhaled through the nostrils	Inhalational	Evil eye	[24]
				Leaf	crushed/decocted and taken	Oral	Evil eye	[58]
Crush, powder then tie on the neck or take with tooth	Oral, topical	Evil eye, evil spirit	[26]					
49	<i>Datura stramonium</i> L. (Solanaceae)	Astenagir (Amh)	Herb	Leaf	Leaves are crushed, squeezed, filtered and a cup of juice is taken for some days	Oral	Brain sharpness	[12]
				Seed	The seed is ground and smoked or mixed with butter and put on head	Inhalational, topical	Depression	[77]
50	<i>Erythrina abyssinica</i> Lam. ex DC. (Fabaceae)	Zuwabue (T)	Tree	Bark	Put the bark on fire and let patient to fumigate himself with smoke	Inhalational	Evil eye	[12,58]
51	<i>Klinia odora</i> Forssk. (Asteraceae)	Berier (T)	Shrub	Whole plant	House is fumigated to repel snakes and expel evil spirit	Inhalational	Evil eye, evil spirit	[12]

52	<i>Lepidium sativum</i> L. (Brassicaceae)	Shenfa (T)	Herb	Seed	Grind seeds, add powder into water and spray solution indoor to expel evil spirit	Topical	Evil spirit	[12,66]
					A cup of powder was mixed with water and sprayed in and around the house at the first day of the month	Inhalational	Evil eye	[66]
53	<i>Plumbago zeylanica</i> L. (Plumbaginaceae)	Aftihi (T)	Shrub	Root	Roots are fumigated in the house	Inhalational	Evil eye, evil spirit, magic	[12]
54	<i>Tagetes minuta</i> L. (Asteraceae)	Etsefaruos (T)	Herb	Whole plant	Smoking the plant and let the patient fumigate himself	Inhalational	Evil eye	
				Leaf	Some leaves were crushed and smelt during illness	Inhalational	Evil eye	[66]
55	<i>Aloe camperi</i> Schweinf. (Aloaceae)	NM	Shrub	Leaf	It is placed on burning dung with <i>Otostegia integrifolia</i> and fumigated the house and is inhaled	Inhalational	Evil spirit at birth	[14]
56	<i>Ceratostigma abyssinicum</i> Asch. (Plumbaginaceae)	NM	Shrub	Root	It is the same as used in <i>A. sativum</i> ; the powder is tied in the neck with Abesha cloth and the remnant is inhaled through nose	Inhalational, topical	Evil eye	
57	<i>Echinops hispidus</i> Fresen. (Asteraceae)	Keberchoo (O)	Herb	Root, stem	It is crushed and placed on the hot fire and inhaled by all householders	Inhalational	Evil eye	
58	<i>Lobelia rhynchoptalum</i> Hemsli. (Lobeliaceae)	Jabra (Amh)	Herb	Root, stem	It is the same method and ingredient of <i>A. sativum</i>	Oral	Evil eye	[23]
				Root	The dried root tied with piece of cloth around the neck or put in to the pocket	Topical	Evil eye	
				Bark, root	The bark and root of <i>Lobelia rhynchoptalum</i> is crushed, mixed little water and sniffed at the sickness time	Inhalational	Evil eye	[68]
59	<i>Momordica foetida</i> Schumach. (Cucurbitaceae)	Minaan loa (O)	Herb	Whole plant Root Leaf	The whole parts are pounded and immersed in pot water for three days and body is washed Crushed and Washed Squeezed and 1/2 coffee cup is given	Topical Topical Oral	Psychiatric disorder Evil eye Evil eye	[14] [17]
				Fruit	Boil and fumigate	Inhalational	Evil spirit	[26]
60	<i>Otostegia integrifolia</i> Benth. (Lamiaceae)	Tunjut (T)	Shrub	Above ground	The aboveground parts are fumigated on hot fire, especially for the new birth time	Inhalational	Evil spirit	[14,18,46]
				whole plant	Chew and spit into mouth	Oral	Evil eye	[76]
				Whole plant	Chopped and fumigate home using local stoves; chopped and used to take a smoke bath; people chew the leaves and spit into mouth	Inhalational	Evil eye	[64]

61	<i>Rubus apetalus</i> Poir. (Rosaceae)	NM	Climber	Root	Crushed and powdered root is fumigated and the aroma of the smoke at night is smelt	Inhalational	Evil eye	[14]
62	<i>Sida schimperiana</i> Hochst. ex A. Rich. (Malraceae)	Kindichuwa (D)	Shrub	Root	It is the same method and ingredients used in <i>A. sativum</i>	Oral, topical	Evil eye	
				Leaf	Fumigate every evening with the root	Inhalational	Evil eye	[24]
				Leaf	crushed the leaf and taken , smelling the leaf	Oral, topical	Evil eye	[58]
63	<i>Solanum marginatum</i> L. f. (Solanaceae)	NM	Shrub	Fruit	Roasted and pierced ripe fruit can be eaten with straw or hay foddors	Oral	Evil eye	[14]
64	<i>Verbascum sinaiticum</i> Benth. (Scrophulariaceae)	NM	Herb	Root	It is crushed alone or with <i>C. ficifolus</i> and then half index finger size by a tea glass is drunk	Oral	Psychiatric disorder	
65	<i>Maytenus senegalensis</i> (Lam.) Excell (Celastraceae)	Shekko (Amh)	Shrub	Seed	Powdered fresh/dry seed with water or butter is taken with coffee or tea as drink for five days	Oral	Epilepsy	[15]
				Leaf, root	crushed the root and leaf/decocted taken	Oral	Evil eye	[58]
				Root	Crush by mixing it with roots of <i>Clerodendrum myricoides</i> , <i>Withania somnifera</i> , <i>Carissa spinarum</i> and <i>Jasminum gratissimum</i> and place it on fire for fumigation	Inhalational	Evil sprit	[27]
66	<i>Cordia africana</i> Lam. (Boragnaceae)	Waddissa (Amh)	Tree	Root	Powdered dry root bark is sprinkled on burning charcoal and smoke is inhaled covered by cloth	Inhalational	Evil eye	[15]
67	<i>Grewia ferruginea</i> Hochst ex A. Rich (Tiliaceae)	Ogomdii (Amh)	Shrub	Root bark	Pounded fresh/dry root bark mix with butter is taken as drink before breakfast for three days	Oral	Evil eye	[15]
68	<i>Aloe megalacantha</i> Bark. (Aloaceae)	Ere (T)	Shrub	Leaf	Place leaf on fire and fumigate	Inhalational	Evil eye	[16]
69	<i>Cyphostemma junceum</i> (Webb) Desc. ex Wild & R.B. Drumm (Vitaceae)	Etse zewye (T)	Herb	Leaf	Place part on fire for fumigation	Inhalational	Evil eye	
70	<i>Euclea racemosa</i> Murr. Subsp. Schimperi (A.DC.) F. White (Ebenaceae)	Keleaw (T)	Shrub	Whole plant	Crush and tie powder around the neck	Topical	Evil eye	
71	<i>Solanum hastifolium</i> Hochst. ex Dunal in DC. (Solanaceae)	Alalmo kalbi (T)	Shrub	Root	Place it on fire for fumigation	Inhalational	Evil eye	
72	<i>Acacia abyssinica</i> Hochst. ex Benth (Fabaceae)	Girar (Amh)	Tree	Root	Crush and place on fire for fumigation	Inhalational	Evil eye	[79]
					The root is crushed with garlic, squeezed in water and then few droplets of juices are taken through the nose	Inhalational	Evil eye	
73	<i>Kniphofia pumila</i> (Ait.) Kunth. (Asphodelaceae)	Shingurti zibie (T)	Herb	Bulb	Soak it in water with leaves of <i>Rumex nervosus</i> and wash body with it	Topical	Evil eye	[16,27]

74	<i>Indigofera arrecta</i> A. Rich. (Fabaceae)	Gerewda (O)	Herb	Leaf	Crushed and smoked	Inhalational	Evil eye	[17]
				Root	Fresh root roasted and fumigated or crushed and mixed with water and consumed	Inhalational	Epilepsy	[22]
75	<i>Rumex nervosus</i> Vahl. (Polygonaceae)	Harqasis (O)	Shrub	Leaf	Squeezed with leaves of <i>Ruta chalepensis</i> and drunk 1/2 coffee cup	Oral	Evil eye	[17]
76	<i>Thalictrum rhynchocarpum</i> Dill. & A. Rich. (Ranunculaceae)	Inchiilal badaa (O)	Herb	Leaf	Crushed and smoked	Inhalational	Epilepsy	
77	<i>Verbena officinalis</i> L. (Verbenaceae)	Attuchi (O)	Herb	Root	Squeezed and taken	Oral	Evil eye	[17,58]
78	<i>Hypericum quartianum</i> A. Rich. (Hyericaeae)	Mukefoni (O)	Shrub	Leaf	Fresh pulverized	Oral	Evil eye	[50]
79	<i>Buddleja polystachya</i> Fresen. (Loganiaceae)	Metere (T)	Tree	Above ground part, Stem	Add to fire and expose to the smoke	Inhalational	Psychosis	[18,58]
					Cut the stem and tie on the neck	Topical	Evil sprit	[62]
80	<i>Cucurbita pepo</i> L. (Cucurbitaceae)	Jamba (Ku)	Herb	Stem, fruit	Seed and fruit is added with feces of donkeys, add to fire and expose to the smoke	Inhalational	Evil eye	[18,55]
81	<i>Ficus sycomorus</i> L. (Moraceae)	Challa (Ku)	Tree	Bark	With its bark, add to fire expose the patient to the smoke in the evening	Inhalational	Psychosis	[18]
82	<i>Jacaranda mimosifolia</i> D. Don. (Bignoniaceae)	Chegenne (Ku)	Tree	Root, bark	The root and bark is crushed, apply the fine powder nasally	Inhalational	Evil eye	
83	<i>Senna italica</i> Mill. (Fabaceae)	Derra (Ku)	Shrub	Root	Crushing the dried root and apply a fingertip of the fine powder nasally	Inhalational	Psychosis	
84	<i>Sida ovate</i> Forssk. (Fabaceae)	Deki daero (Ku)	Herb	Root	Crushing the root, the fine powder is mixed with sulfur and bark of <i>Securidaca longipedunculata</i> add to fire and expose to the smoke	Inhalational	Psychosis	
85	<i>Spermacoce sphaerostigma</i> (A. Rich.) Vatke (Rubiaceae)	Tinigita (T)	Herb	Above ground part	Pounding the above ground part, homogenize with water the juice and apply it to the bed where he/she sleeps	Topical	Psychosis	
86	<i>Acacia etbaica</i> Schweinf. (Fabaceae)	Derie (Amh)	Tree	Root	Dried or fresh root powder fire smoke is fumigated	Inhalational	Evil eye	[51]
87	<i>Acokanthera schimperi</i> (A.DC.) Schweinf, (Apocynaceae)	Mirez (Amh)	Shrub	Stem	Dried tender single stem's leaf or roots crushed with water and squeezed a drops through nasal region	Inhalational	Evil eye	[51]
				Seed	Dry seeds tied on the neck for children	Topical	Evil eye	[75]

88	<i>Dodonaea angustifolia</i> L.f. (Sapindaceae)	Kitkita (Amh)	Shrub	Leaf	Dried leaf is mixed with leaf of <i>Acokantheraschimperi</i> , powdered and given for fire fumigation	Inhalational	Evil eye	[51]
89	<i>Mukia maderaspatana</i> (L.) M.J. Roem. (Cucurbitaceae)	Gim-Areg (Amh)	climber	Root, stem	Dried or fresh root and stem chopped and tied on neck or waist	Topical	Evil eye	
90	<i>Olea europaea</i> subsp. <i>cuspidata</i> (Wall. ex G. Don) Cif. (Oliaceae)	Woyra (Amh)	Tree	Leaf	Dried leaf powder fire smoke is allowed to inhale	Inhalational	Psychiatric disease, Evil eye	
				Stem	Beating with fresh stick	Topical	Evil eye	[26]
91	<i>Senna singueana</i> (Del.) Lock, (Fabaceae)	Gufa (Amh)	Shrub	Leaf	Fresh leaf mixed with <i>Rumex nervosus</i> flowers is used for fire fumigation	Inhalational	Evil Eye, Depression	[51]
92	<i>Tragia cinerea</i> (Pax) Gilbert & Rodel.-Smith (Euphorbiaceae)	Alebilabit (Amh)	-	Root	Dried or fresh root fire smoke allowed to enter orally	Oral	Evil eye	
93	<i>Ziziphus spina-christi</i> (L.) Desf (Rhamnaceae)	Qurqura/Geba (Amh)	-	Leaf, root	Dried leaf or root is used for fire fumigation	Inhalational	Evil eye	
94	<i>Carissa spinarum</i> L. (Apocynaceae)	Agamsa (O)	Shrub	Root	The roots are ground and warmed on fire then inhaled	Inhalational	Evil eye	[52]
					Root together with <i>Withania somnifera</i> and sulphur are pounded together added to fire and smoke to the patient	Inhalational	Evil spirit	[24]
					Root of <i>Carissa spinarum</i> is pounded and dried. Dry smoke is used as treatment for evil eye.	Inhalational	Evil eye	[69]
95	<i>Acacia dolichocephala</i> Harms (Fabaceae)	NM	Tree	Root	Taking dried root parts & fumigating the patient	Inhalational	Evil eye	[57]
96	<i>Euphorbia tirucalli</i> L. (Euphorbiaceae)	Kinichibae (Amh)	Shrub	Stem, Root	Young branches are burnt for smoke bath Boiled roots mixed with sugar are drunk	Inhalational, Oral	Evil eye epilepsy	[21]
97	<i>Gymnosporia senegalensis</i> (Lam.) Loes. (Celastraceae)	Kombolcha (O)	Shrub	Leaf, bark, root	Leaf, bark, and root are dried, powdered and mixed together with honey and drunk as tea thrice daily morning for 3 days	Oral	Evil eye	
98	<i>Ocimum lamiifolium</i> Hochst. ex Benth. (Lamiaceae)	Damakasio (Amh)	Herb	Leaf	Crushed leaves are squeezed or smoke inhaled.	Inhalational	Evil eye	
99	<i>Ageratum conyzoides</i> L. (Asteraceae)	Tufo (O)	Herb	Leaf	The fresh leaves are squeezed and the juice is diluted with water for drink	Oral	Evil eye	[54]
100	<i>Cucumis ficifolius</i> A. Rich. (Solanaceae)	Ye' mider enboyi (Amh)	Climber	Root, leaf	Fresh pounded leaves and roots are infused in water for 7 days and taken	Oral	Epilepsy	
				Bark	Dried bark and leaf of <i>Cucumis ficifolius</i> will be powdered together then mixed with alcohol, and one cup is taken by human	Oral	Epilepsy	[72]

101	<i>Phyllanthus limmuensis</i> Cufod. (Euphorbiaceae)	Aselfudi (G)	Shrub	Root	Ground and drunk with Water	Oral	Psychosis	[56]
102	<i>Piliostigma thonningii</i> (Schumach.) Milne-Redh (Fabaceae)	Magel Mukul (G)	Tree	Root	Dried, put in fire and patient is exposed to the smoke	Inhalational	Psychosis	
103	<i>Aristolochia bracteolata</i> Lam. (Aristolochiaceae)	Abujelalen (G)	Climber	Root	Ground, dispersed in water and drunk and applied to body	Topical	Psychosis	
104	<i>Waltheria indica</i> L. (Sterculiaceae)	Albe (G)	Herb	Root	Ground, dispersed in water then drunk and also applied on the head	Oral	Psychosis	
105	<i>Crotalaria albicaulis</i> Franch. (Fabaceae)	Qorsa Direyaa (O)	Shrub	Root	Crushing the root, boiling it and washing part of the body where pain is feeling without touching the ground with legs.	Topical	Evil eye	[57]
106	<i>Biophytum umbraculum</i> Welw. (Oxalidaceae)	Dango/shidho (D)	Herb	Root	Crushed/powdered mixed with water taken a cup of it	Oral	Epilepsy	[58]
107	<i>Brachiaria brizantha</i> (A. Rich.) Stapf (Poaceae)	Shaalishatu (D)	Herb	Root	Crushed and taken orally for children and chewing the root by adults	Oral	Epilepsy	
108	<i>Crepis rueppellii</i> Sch. Bip. (Asteraceae)	Maas'uwa (D)	Herb	Whole parts	Decoction	Topical	Evil eye	
109	<i>Dicrocephala integrifolia</i> (L. f.) Kuntze (Asteraceae)	Sa'a'-okata malaa (D)	Herb	Leaf	Crushed/decocted and applied through nose and rubbed on the surface of head	Topical, oral	Epilepsy	
110	<i>Galinirea saxifrage</i> (Hochst.) Bridson (Rubiaceae)	Deesha loomiya (D)	Shrub	Leaf, root	crushed and mixed with milk applied through oral	Oral	Epilepsy	[58]
111	<i>Glycine wightii</i> (Wight & Arn.) Verdc. var. <i>longicauda</i> (Schweinf.) Bak. (Fabaceae)	Tooguwa tura (D)	Climber	Root	Crushed/decocted and can be concocted/mixed with milk taken	Oral	Evil eye	[26,59]
112	<i>Helichrysum</i> sp. (Asteraceae)	Samba lolo (D)	Herb	Leaf	Crushed and mixed with water taken through eye, nose, oral and rubbed on the skin	Inhalational, oral	Evil eye	
113	<i>Laggera tomentosa</i> (Sch.Bip. ex A. Rich.) Oliv. & Hiern (Asteraceae)	Sesa/ Geleshotanbuwa (D)	Shrub	Leaf	Crushed and applied orally	Oral	Evil eye	
114	<i>Satureja abyssinica</i> (Benth.) Briq. (Lamiaceae)	Wuta malaa(D)	Herb	Leaf	Crushed and applied orally and dermal by simply smelling the leaf	Inhalational, oral	Epilepsy	
115	<i>Artemisia abyssinica</i> schtz, Afra Jacq (Asteraceae)	Chikugn (Amh)	Herb	Leaf	The leaves are pounded as they are fresh and mixed with powdered garlic and smelled to the patient	Inhalational	Evil eye	[26,59]
					The leaf is boiled and the affected body is showered with it	Topical	Evil eye	[73]
					Inhale plant odor, drink aqueous infusion	Inhalational	Evil eye	[63]
				Whole plant	Mix with bulbs of <i>Allium sativum</i> and smell it	Inhalational	Evil eye	[27]

116	<i>Punica granatum</i> L. (Punicaceae)	Ruman(O)	Shrub	Seed	Dried seeds crushed and mixed with water and taken Oral	Oral	Evil eye	[22]
				Leaf, seed	The leaves and seeds are grounded, mixed with milk and drunk	Oral	Evil spirits	[65]
117	<i>Silene macrosolen</i> A. Rich. (Caryophyllaceae)	Wegert (Amh)	Herb	Root, leaf	Smoking a mixture of <i>Silene macrosolen</i> and <i>Silybum marianum</i>	Inhalational	Evil eye	[22]
				Root	Partly dried root together with <i>Carisa spinarium</i> , <i>Capparis tomentosa</i> , <i>Ruta chalepensis</i> is fumigated in a closed room	Inhalational	Evil spirit	[24]
118	<i>Pavetta abyssinica</i> Fresen. (Rubiaceae)	Bootha Bekkaa (K)	Shrub	Leaf	Crushed fresh leaf homogenized in water to drink and with the residue soak the whole body	Oral, topical	Evil eye	[61]
119	<i>Acacia lehai</i> Steud. & Hochst. ex Benth. (Fabaceae)	Lehay (T)	Tree	Stem	the neck covering by piece of clothes	Topical	Evil spirit	[62]
120	<i>Kleinia squarrosa</i> Cufod. (Compositae)	Be_erere (Amh)	Shrub	Stem, root	Fumigate and inhale the smoke	Inhalational	Evil eye, evil spirits	[63]
121	<i>Nicotiana glauca</i> Graham (Solanaceae)	Chergid	Herb	Leaf, stem	Chopped and used to take a smoke bath	Inhalational	Evil eye	[64,76]
122	<i>Acanthus sennii</i> Chiov. (Acanthaceae)	Key kusheshilie (Amh)	Shrub	Root	Sniff, drink and fumigate with	Inhalational, oral	Evil eye	[26]
123	<i>Sida tenuicarpa</i> Vollesen (Malvaceae)	Chifrig (Amh)	Shrub	Root	Used as tooth brush or tie on neck	Topical, oral	Evil spirit & evil eye	
124	<i>Solanecio gigas</i> Vatke (Asteraceae)	Yashikoko gomen (Amh)	Shrub	Root	Sniff, drink and fumigate With concoction	Topical, oral, inhalational	Evil eye	
125	<i>Colutea abyssinica</i> Kunth & Bouché (Fabaceae)	Taetaeta (T)	Shrub	Root bark	Tie around the neck	Topical	Evil eye	[27]
126	<i>Jasminium gratissimum</i> Deflers (Oleaceae)	Habi Tselim (T)	Climber	Root	Crush by mixing with roots of <i>Clerodendrum myricoides</i> , <i>Withania somnifera</i> , <i>Carissa spinarum</i> and <i>Maytenus senegalensis</i> and place it on fire for fumigation	Inhalational	Evil sprit	
127	<i>Myrica salicifolia</i> A. Rich (Myricaceae)	Nibie (T)	Tree	Root, Bark	Tie it on the body; Crush and add liquid through the nose; Tie and place it on fire for fumigation	Inhalational	Evil eye	
128	<i>Sphaeranthus suaveolens</i> (Forssk.) Dc. (Asteraceae)	Rashaid (S)	Herb	Leaf	The leaves or fruit are grounded, and mixed with water, oil and honey, and applied to the head	Topical	Unspecified	[65]
129	<i>Clutia abyssinica</i> Jaub. & Spach (Euphorbiaceae)	NM	Shrub	Root	Few roots were placed on fire and fumigated by the smoke for few minutes	Inhalational	Evil eye	[66]
130	<i>Hypoestes forskoolii</i> (Vahl)R. Br. (Acanthaceae)	Busente (H)	Herb	Leaf	Small powder was added on a fire and fumigated by the smoke	Inhalational	Evil eye	
				Root	Fresh roots are ground, macerated in water, filtered and drunk.	Oral	Evil eye	[71]

131	<i>Solanum schimperianum</i> Hochst. ex A. Rich. (Solanaceae)	NM	Shrub	Leaf, branch	A branch of it was placed on fire and fumigated by its smoke	Inhalational	Evil eye	[66]
132	<i>Dovyalis abyssinica</i> (A. Rich.) Warb. (Flacourtiaceae)	NM	Shrub	Branch	Some branches were placed on fire and fumigated during illness	Inhalational	Evil eye	
133	<i>Balanites aegyptiaca</i> (L.) Del. (Balanitaceae)	Uddayto (Af)	Tree	Root	The latex of the plant is administered intranasally	Inhalational	Epilepsy	[19]
134	<i>Osyris quadripartita</i> Decn. (Santalaceae)	Waatoo (Af)	Shrub	Root	Root will be smoked and inhaled	Inhalational	Evil eye	[67]
135	<i>Viscum tuberculatum</i> A. Rich (Viscaceae)	Yaweyira taqatila(Af)	Shrub	Stem	Stem will be tied on the body	Topical	Evil eye	
136	<i>Clausena anisata</i> (Willd.) Benth. (Rutaceae)	Limech (Amh)	Tree	Root	The fresh root of <i>Clausena anisata</i> is crushed and mixed with water and drunk	Oral	Evil eye	
137	<i>Embelia schimperi</i> Vatke. (Myrsinaceae)	Kokoko (Amh)	Tree	Fruit	The fruit of <i>Embelia schimperi</i> with seed of <i>Guizotia abyssinica</i> crushed, powdered, mixed with local alcoholic “tej” and drunk	Oral	Epilepsy	[68]
138	<i>Opuntia ficus-indica</i> (L.) Miller. (Cactaceae)	Yeashewa kulkel (Amh)	Herb	Leaf	The leaf of <i>Opuntia ficus-indica</i> is crushed, squeezed and creamed on wounded part	Topical	Epilepsy	
139	<i>Crateva adansonii</i> De. (Capparidaceae)	Qollaadii (O)	Shrub	Root	Root of <i>Crateva adansonii</i> is pounded with root of <i>Ruta chalepensis</i> . The solution is sniffed	Inhalational	Evil eye	[69]
140	<i>Pterolobium Stellatum</i> (Forssk.) Brenan. (Fabaceae)	Harangamaa Qore (O)	Shrub	Root	Root of <i>Pterolobium stellatum</i> and root of <i>Ruta chalepensis</i> are powdered and sniffed	Inhalational	Evil eye	
140	<i>Passiflora molisssima</i> (Kunth) Baliy. (Passifloraceae)	NM	Climber	Fruit	One glass of droplets (juice) of fruit is drunk to bring deep sleep	Oral	Insomnia	[23]
141	<i>Plectranthus edulis</i> Vatke (Lamiaceae)	Dinicha Oromo (O)	Herb	Leaf, root	The leaf and flower ground together, and given to the victim, 2-3 teaspoon twice a day for 2 days.	Oral	Epilepsy	[70]
142	<i>Albizia gummifera</i> (J.F.Gmel.) C.A.Sm. (Fabaceae)	Imala (O)	Tree	Root	Dried root of <i>Albizia gummifera</i> and <i>Pterolobium stellatum</i> will be crushed together and the smoke of 3-4 spoon of the mixture will be inhaled	Inhalational	Evil eye	[72]
143	<i>Artemisia abyssinica</i> Sch. Bip.ex A. Rich. (Asteraceae)	Xiroo (O)	Herb	Leaf	Fresh leaf of <i>Artemisia abyssinica</i> , <i>Brucea antidysenterica</i> and <i>Cucumis ficifolius</i> are pounded together mixed with a tea cup of water and drunk	Oral	Epilepsy	

144	<i>Pterolobium stellatum</i> (Forssk.) Brenan (Fabaceae)	Arangama (O)	Shrub	Root	Root of <i>Pterolobium stellatum</i> and root of <i>Ruta chalepensis</i> will be powdered together and sniffed	Inhalational	Epilepsy	[72]
					Root of <i>Pterolobium stellatum</i> is dried powdered and one spoon of the powder is mixed with half cup of local alcohol and given to human	Oral	Epilepsy	[72]
145	<i>Fagaropsis angolensis</i> (Engl.) Milne-Redh (Rutaceae)	NM	Tree	Seed, leaf	The seed together with leaf of <i>Solanum</i> species called EMBUWAY (Am.) is squashed and drunk with coffee	Oral	Epilepsy	[73]
146	<i>Pycnostachys abyssinica</i> Fresen. (Lamiaceae)	NM	Herb	Leaf	The squashed leaf extract is used as lotion on body	Topical	Evil eye	
147	<i>Gardenia ternifolia</i> Schumach. & Thonn. (Rubiaceae)	Gambillo (Amh)	Tree	Stem bark	The stem bark and root mixed with bulbs of garlic is crushed, powdered, homogenized in water and one cup is drinking and small droplets are also administrated through the nose	Inhalational	Evil eye	[79]
148	<i>Nicotiana tabacum</i> L. (Solanaceae)	Tombo (O)	Herb	Leaf	Bath the patient with leaf decoction of <i>Nicotiana tabacum</i> , <i>Ocimum lamii folium</i> , <i>Withania somenifera</i> for a week	Topical	Epilepsy	
149	<i>Toddalia asiatica</i> (L.) Lam. (Rutaceae)	Harangamaa (O)	Herb	Root	The root is chewed and swallowed	Oral	Evil eye	[24]
					Fresh root is crushed and the infusions taken, a cup of the solution twice a day	Oral	Evil eye	
				Leaf	Leaf is crushed and then the decoction is mixed with coffee and drunk	Oral	Evil eye	
150	<i>Flacourtia indica</i> (Burm. f.) Merr. (Flacourtiaceae)	Hagaala (Si)	Shrub	Whole plant	Dry parts of the plants put in to the fire and Smoking	Inhalational	Evil eye	
151	<i>Delbergia lactea</i> Vatke. (Fabaceae)	Batissa (Si)	Shrub	Leaf	Fresh leafs are pounded with water then drunk and the extract are painting on the body	Oral	Evil eye	[75]
152	<i>Urtica dioica</i> L. (Urticaceae)	Lalesa (Si)	Climber	Leaf	Dry/fresh leaves are crushed, pounded and filter then drunk and painting on the body	Oral	Evil eye	
153	<i>Kanahia laniflora</i> (Forssk.) R. Br. (Asclepiadaceae)	Jida hanani (O)	Herb	Root	The root is ground and taken with milk	Oral	Evil spirit	[77]
154	<i>Commiphora myrrha</i> (Nees) Engl. (Bursaceae)	Karbee (O)	Tree	Resin	The smoke of resin is inhaled	Inhalational	Evil eye	

Medicinal plants, growth forms and plant parts used

One hundred fifty four medicinal plants distributed in different families were found from the reviewed studies. Families, Fabaceae and Asteraceae each account 18 (11.7%) and 17 (11%), respectively. About thirty six percent of the plants were shrubs (42.5%) followed by herbs (33.8%). Trees and climber types of plants comprise 17.5% and 12.3%, respectively. The commonly used plant parts were roots (41%). Leaf accounts about 25% of the total plant parts consumed (Figure 2).

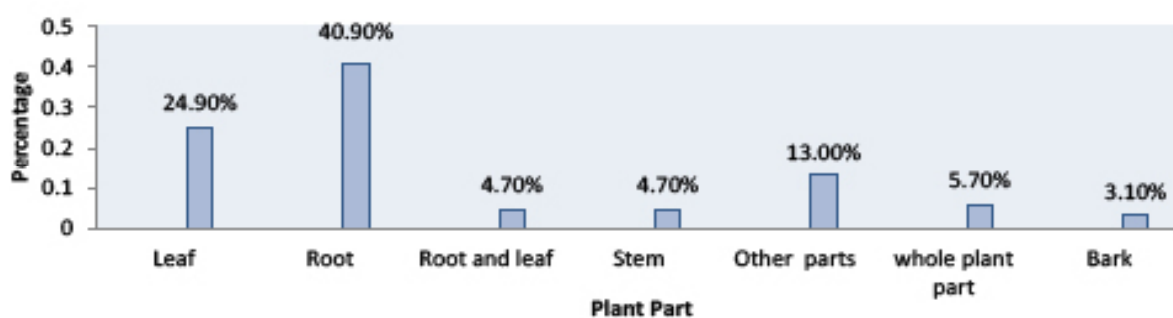


Figure 2: Frequency distribution of plant parts

Method of preparation and route of administration

As shown in Table 1, practitioners use simple techniques of preparation like drying, crushing, eating with some other plants or animal products. The traditional medical practitioners use simple methods and equipments during their remedy preparation. Of the routes commonly used to administer remedies in the treatment of mental illnesses, inhalational (45%) was the common route followed by oral (27.7%) way of administration. One preparation was intended to be administered auricularly (Figure 3).

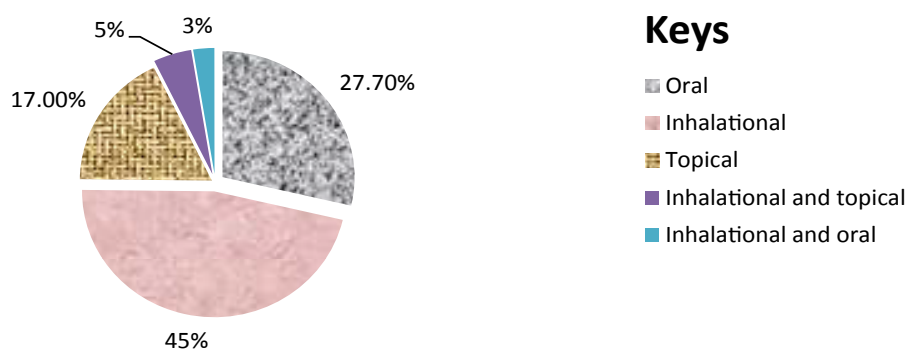


Figure 3: Frequency distribution of common routes of administration

Common mental illnesses treated

According to this review, epilepsy, evil eye/Buda, depression and schizophrenia are the mental health disorders treated by practitioners of the country, off which evil eye; locally called in different parts of the country *Buda* and epilepsy are the common mental disorders [20-25].

DISCUSSION

This review revealed that about one hundred fifty four plant species find applications by the traditional medical practitioners of the country to treat different types of mental disorders. Those plants were identified and distributed in 61 families. According to this review there is high species diversity of medicinal plants used which may be due to the climate variation that exists with the different parts of the country. Families, Fabaceae and Asteraceae each account 18 (11.7%) and 17 (11%), respectively. Similarly, a study done in Spain [17] and Korea [28] showed that Asteraceae has the highest number of medicinal plants. Caesalpinaceae was the family with higher number of plants according to the study in Nigeria [29].

In the traditional treatment of mental illnesses in Ethiopia, various plants parts either in combination, whole plant part or alone are employed. In the combination scenario, the practitioners may believe that the active therapeutic ingredient

is found at two or more parts of the plant. According to this review, root was the most commonly used plant part in the preparation of remedies as compared to other parts. But, the use of plants roots for various purposes has its own problems on the survival of the plant species. But studies conducted elsewhere showed the dominance of leaves in the preparation of traditional remedies [29,30]. Medicinal plant harvest that involves roots, rhizomes, bulbs, barks and stems have serious effect on the survival of mother plants as is the case with the finding of this review [31,32].

Medicinal plants were formulated in various forms using different solvents and additives. Practitioners prepare remedies in such a simple manner without further processing which may be due to the lack of education and processing instruments. Practitioners used coffee, milk and alcohol as additives to increase the medicinal value of the remedies. The rationale behind the use of honey and sugar is to make the formulation more palatable. This is supported by a study done in Israel [30] and Hawasa [33]. Practitioners also use diluents like water to facilitate the dissolution and hence rapid action of the plant. In addition to this they use fire which can easily expel the active ingredients of the claimed plant, by doing so the plant material can easily get in the different parts of the body which in turn facilitates rapid healing. However, according to this review as it may be true for studies too, the dose given to a mental illness patient is far from standardization, which needs urgent intervention and scientific validation especially for those plant remedies which are given systemically like through oral and inhalational routes. This is particularly important in the case of pregnant mothers, children and geriatrics. One interesting thing that is scientifically acceptable though it needs scientific evidence in this case is that practitioners combine two or more medicinal plants together which can bring synergistic effect [34].

This review also revealed that greater proportions of remedies were given inhalationally which unlike with results of other studies [17,29,30,35-44]. Practitioners prefer simple routes like intranasal, topical and oral due to their inability to administer remedies in other routes like intravenous and subcutaneous. Inhalational routes permit the most rapid physiological reaction of the prepared remedies with the cause of the disease and increase their curative power. However, studies conducted in Sheko ethnic group, Southwest Ethiopia [44] revealed that most medicinal plant preparations were taken cutaneously. Majority of the medicinal plants identified belong to shrubs and herbs. However, other studies conducted elsewhere indicated the dominance of herbs [34,43]. As known, herbs are seasonal which implies that they are not accessible throughout a year which needs storage but can be easily cultivated in a limited area.

Concerning the mental illnesses treated, diverse types of severe and milder issues were raised but most of them lack scientific/ medical specifications which may be due to the involvement of various body systems when the central nervous system is affected. Other common aspect of the mental illnesses is the most of them are culture bound and are assumed to be treated by traditional ways. Most of the Ethiopian community still reside on the traditional treatment of mental illnesses. This needs scientific validation of the doses to be given, the possible side effects as well as drug-drug and drug food interactions.

CONCLUSION

In the present review, a total of one hundred fifty four medicinal plants have been identified and recorded for their use in management of various mental illnesses in Ethiopia. Herbs and shrubs constitute majority of the plants while the commonly used plant part was root. While traditionally treating mental illnesses, most practitioners prefer inhalational route of administration. Thus, it is relevant for researchers in the field to conduct the safety and efficacy study of the traditionally claimed medicinal plants. Epilepsy and *Buda* are the common mental disorders treated traditionally.

DECLARATIONS

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Availability of data and material

No additional data are required; all information is clearly stated in the main manuscript.

Competing of Interests

The authors have declared that there is no competing interest.

Authors' contribution

MW, MS: Conception of research protocol, study design, literature review, data extraction, data analysis, interpretation and drafting the manuscript. HR, DD, MA: Data analysis and quality assessment.

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