



Herbal Sources of Antidepressant Potential: A Review

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ABSTRACT

The history of herbal medicines is as old as human civilization. The documents revealed that plants were used medicinally in China, India, Egypt and Greece long before the beginning of the Christian era. The human being appears to be afflicted with more diseases than any other animal's species. They sought to alleviate their sufferings from injury and disease by taking advantage of plant growing around them. Depression is such a common mental disorder, which affects the personal and social relations of a person. There are variety of neuro chemical theories proposed and number of synthetic antidepressant drugs are available now a days, however their effectiveness does not come up the entire range of population suffering from this disorder. Moreover the side effects and the drug interactions are major restrictions in their clinical applications. Unlike, synthetic medications, herbal medicines are widely used across the globe due to their wide applicability and therapeutic efficacy associated with least side effects, which in turn has initiated the scientific research regarding the antidepressant activity. The aim of this review is to enlist those plants which have antidepressant activity and the various experimental models used to screen their antidepressant activity.

Keywords: Depression, Forced Swimming Test, Tail Suspension Test, Herbal Medications.

INTRODUCTION

The Indian subcontinent is enriched by a variety of flora both aromatic and medicinal plants. This is due to the wide diversity of climatic conditions in India ranging from deserts to swamplands. Numerous types of herbs have been well recognised and catalogued by botanist from the high ranges of the Himalayan tract up to the sea-shores of Kanyakumari.¹ In recent years, focus on plants research has increased all over the world and a large body of evidence has been collected to show immense potential of medicinal plants used in various traditional systems.²

According to World Health Report, about 450 million people suffer from a mental or behavioural disorder.³ This amounts to 12.3 % of the global burden of disease, and predicted to rise up to 15 % by 2020.⁴ Depression is a burdensome psychiatric disorder that affects a person's mood, physical health and behaviour. Patients with major depression have symptoms that reflect changes in brain, monoamine neurotransmitters, specifically nor epinephrine, serotonin and dopamine.⁵ The disorder is also often associated with suicide and there are between 10 and 20 million suicide attempt every years. Depression is the most prevalent mental disorder and it is recognised to be symptomatically, psychologically and biologically heterogeneous.⁶

Some features of depressive disorder overlap those of the anxiety disorders, including severe phobias, generalized anxiety disorder, social anxiety disorder, post traumatic stress disorder, and obsessive-compulsive disorder.⁷ The major disorders of mood or affect include the syndromes of major depression (formerly termed melancholia) and bipolar disorder (formerly termed manic-depressive

disorder). Major depression is characterized by feelings of intense sadness and despair, mental slowing and loss of concentration, pessimistic worry, lack of pleasure, self-deprecation, and variable agitation or hostility. Physical changes also occur, particularly in severe, vital, or melancholic depression. These include insomnia or hypersomnia; altered eating patterns, with anorexia and weight loss or sometimes overeating; decreased energy and libido; and disruption of the normal circadian and ultradian rhythms of activity, body temperature, and many endocrine functions.⁸ Dysthymic disorder, also called dysthymia, psychotic depression, postpartum depression,⁹ and seasonal affective disorder are also kinds of depression.¹⁰ There is no single known cause of depression. Rather, it likely results from a combination of genetic, biochemical, environmental, and psychological factors. Some types of depression tend to run in families, suggesting a genetic link. However, depression can occur in people without family histories of depression as well.¹¹

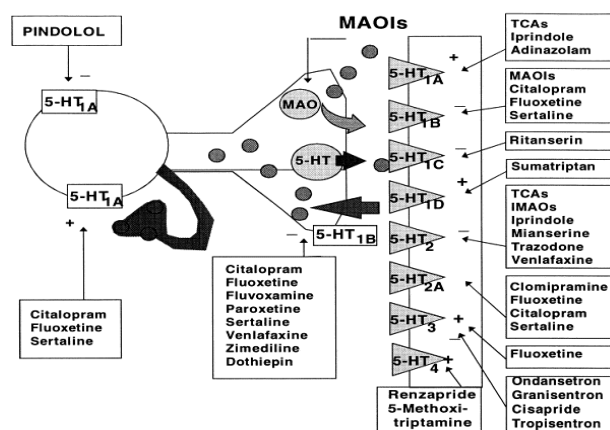


Figure 1: Mode of action of different antidepressant drugs¹²



The monoamine theory, suggests that depression results from functionally deficient monoaminergic (noradrenaline (NA) / 5- hydroxytryptamine (5-HT)) transmission in the central nervous system whereas an excess may result in mania. The theory was based on the ability of known antidepressant drugs (tricyclic antidepressants and monoamine oxidase inhibitors) to facilitate monoaminergic transmission, and of drugs such as reserpine to cause depression.^{13,14} But other theories were also established as permissive theory and receptor sensitivity theory to understand the actual cause of depression.

Herbal stuffs are often well thought-out as safe because they are “innate”. In current years, there is increased research on traditional Ayurvedic herbal medicines on the

basis of their known effectiveness in the treatment of diseases for which they have been traditionally used. Herbal medicine is a major constituent in all conventional medicine systems. Substantial efforts have been directed towards the development of natural products from various plant sources which have antidepressant activity. This review aims to search those medicinal plants which have been reported for its antidepressant activity and also the screening model which have been used by the researcher to investigate the activity. This information will be beneficial for the researchers who want to work on the antidepressant activity as well as the patients of the depression who depend on Ayurveda for their healthcare needs.

Table 1: A brief description of plants having antidepressant property

S. No.	Plant Name	Common name	Family	Part used	Extract used
1.	<i>Areca catechu</i> ^{15,16}	Betel nut	Areaceae	Areca nut	Dichloromethane, Ethanollic
2.	<i>Apocynum venetum</i> Linn. ¹⁷	European dogbane	Apocynaceae	Leaves	Ethanollic
3.	<i>Albizia julibrissin</i> ¹⁸	Persian silk tree	Fabaceae	Bark	Ethanollic
4.	<i>Albizia lebeck</i> ¹⁹	Siris tree	Mimosaceae	Bark	Ethanollic
5.	<i>Aniba riparia</i> ²⁰	St. John's wort	Lauraceae	Unripe fruit	Ethanollic
6.	<i>Aloysia polystachya</i> ²¹	Tede burro	Verbenaceae	Aerial part	Hydroalcoholic
7.	<i>Allium cepa</i> ²²	Bulb onion	Liliaceae	Bulb powder	Alcoholic and aqueous
8.	<i>Asparagus racemosus</i> ²³	Shatavari	Liliaceae	Root	Methanollic
9.	<i>Bacopa monniera</i> ²⁴	Brahmi	Scrophulariaceae	Aerial part	Methanollic
10.	<i>Boophone distica</i> ²⁵	Tumbleweed	Amaryllidaceae	Whole plant	Methanollic
11.	<i>Bupleurum falcatum</i> ²⁶	Chinese thoroughwax	Apiaceae	Fruit	Methanollic
12.	<i>Clitoria ternatea</i> ²⁷	Butterfly-pea	Fabaceae	Plant powder	Methanollic
13.	<i>Canavalia brasiliensis</i> ²⁸	Brazilian jackbean	Fabaceae	Seed	Ethanollic
14.	<i>Curcuma longa</i> ²⁹	Turmeric	Zingiberaceae	Root (rhizome)	Aqueous
15.	<i>Cecropia glazioui</i> ³⁰	Embauba	Cecropiaceae	Leaves	Aqueous
16.	<i>Cimicifuga racemosa</i> ³¹	Black snakeroot	Ranunculaceae	Root (rhizome)	Ethanollic-aqueous
17.	<i>Crocus sativus</i> L. ³²	Saffron	Iridaceae	Petals	Aqueous and ethanollic
18.	<i>Embllica Officinalis</i> ³³	Amla	Euphorbiaceae	Fruit	Aqueous
19.	<i>Galphimia glauca</i> ³⁴	Rain of gold	Malpighiaceae	Whole plant	Methanollic
20.	<i>Gentiana kochiana</i> ³⁵	Trumpet gentian	Gentianaceae	Aerial parts	Diethylether
21.	<i>Gastrodia elata</i> ³⁶	Tian ma	Orchidaceae	Rhizome	Ethanollic
22.	<i>Glycyrrhiza uralensis</i> ³⁷	Sweet root	Leguminaceae	Root	Hexane and ethanollic
23.	<i>Glycyrrhiza glabra</i> ³⁸	Liquorice	Leguminaceae	Root	Aqueous
24.	<i>Hypericum perforatum</i> ^{39,40}	Goatweed	Hypericaceae	Aerial part	Aqueous-ethanollic
25.	<i>Hypericum reflexum</i> L. ⁴¹	Hypericum	Hypericaceae	Aerial part	Methanollic
26.	<i>Kaempferia parviflora</i> ⁴²	Peacock ginger	Zingiberaceae	Whole plant	Alcoholic
27.	<i>Lepidium meyenii</i> ⁴³	Maca	Brassicaceae	Hypocotyls	Aqueous
28.	<i>Marsilea minuta</i> Linn. ⁴⁴	Dwarf waterclover	Marsileaceae	Whole plant	Ethanollic
29.	<i>Momordica charantia</i> ⁴⁵	Karela	Cucurbitaceae	Seed, root	Methanollic
30.	<i>Magnolia officinalis</i> ⁴⁶	Beaver tree	Magnoliaceae	Bark	Aqueous
31.	<i>Morinda officinalis</i> F.C How ^{47,48}	Mulberry	Rubiaceae	Root	Ethanollic
32.	<i>Mimosa pudica</i> Linn. ⁴⁹	Humble plant	Mimosaceae	Leaves	Aqueous
33.	<i>Nardostachys jatamansi</i> ⁵⁰	Nard	Balerianaceae	Root, rhizome	Methanollic
34.	<i>Ocotea duckei</i> ⁵¹	Sweetweed	Lauraceae	Whole plant	Hydroalcoholic
35.	<i>Piper methysiticum</i> Forst ^{58,59,60}	Kava	Piperaceae	Root	Aqueous
36.	<i>Piper laetispicum</i> ⁶¹	Xiao Chang-feng	Piperaceae	Stem, root	Ethyl acetate
37.	<i>Paeonia lactiflora</i> ⁶²	Garden peony	Paeoniaceae	Root	Ethanollic
38.	<i>Ptychopetalum olacoides</i> ⁶³	Marapama	Olacaceae	Bark, root	Ethanollic
39.	<i>Rhazya stricta</i> ⁶⁴	Senhwar	Apocynaceae	Leaves	Aqueous
40.	<i>Radix puerariae</i> ⁶⁵	Kudzu root	Leguminaceae	Whole plant	Ethanollic
41.	<i>Rosmarinus officinalis</i> ⁶⁶	Rosemary	Lamiaceae	Leaves	Hydroalcoholic
42.	<i>Siphocampylus verticillatus</i> ⁶⁷	Mufumbo	Campanulaceae	Aerial part	Hydroalcoholic
43.	<i>Salvia elegans</i> ⁶⁸	Pineapple sage	Lamiaceae	Aerial parts	Hydroalcoholic
44.	<i>Schinus molle</i> L. ⁶⁹	Brazilian peppertree	Anacardiaceae	Leaves	Hexanic
45.	<i>Tinospora cordifolia</i> ⁷⁰	Giloe	Menispermaceae	Whole plant	Aqueous
46.	<i>Thymus pubescens</i> ⁷¹	Firefly thyme	Lamiaceae	Root	Methanollic
47.	<i>Tabebuia avellanadae</i> ⁷²	Moreton bay chestnut	Bignoniaceae	Bark, leaves	Ethanollic
48.	<i>Zingiber officinale</i> ⁴⁶	Ginger	Zingiberaceae	Rhizome	Hydroalcoholic



Plants possesses antidepressant activity

Medications of plant origin are attaining popularity and are explored for a number of diseases, including CNS related disorders like depression.

Antidepressant activity of some medicinal plants

Areca catechu

It is cultivated in different parts of world such as India, Sri Lanka, South Eastern Asia, Malaysia, Indonesia, Philippines, and East Africa etc. It contains a number of Alkaloids, belonging to pyridine piperidine group and derived from amino acid lysine. The various alkaloids are Arecoline, Arecaidine, Guvacine (tetrahydropyridine) and Guvacoline. These alkaloids showed significant antidepressant activity in Forced Swimming Test (FST) and Tail Immersion Test (TST).^{15,16}

Apocynum venetum Linn

This shrub is mainly found in mid and north western china. It contains hyperoside and isoquercetin, the main flavonoids which are found in the extract. The leaf extract of the plant showed significant decrease in immobility time in FST at the dose 125mg/kg.¹⁷

Aniba riparia

Aniba riparia (Nees) Mez showed its anti-depressant like activity due to its phytoconstituent riparin III; which at the dose of 25 and 50 mg/kg, *i.p.*, showed antidepressant-like activity in mice when tested in Tail Suspension Test (TST) and FST.²⁰

Aloysia polystachya

Hydro-alcoholic extract of the leaves of *Aloysia polystachya* (Griseb.) at the dose of 12.5, 25 and 50 mg/kg, *i.p.* produced antidepressant like action in female Sprague-Dawley rats when tested in Forced Swim Test (FST). Thujone and carvone was the main phytoconstituent responsible for antidepressant-like action. The efficacy of the extract was comparable to fluoxetine (10 mg/kg, *i.p.*) and imipramine (12.5 mg/kg, *i.p.*).²¹

Bacopa monnieri Linn

This is commonly found in wet, damp and marshy places in India and subtropical region. It is also known as Brahmi and its main constituents are Brahmine, herpestine and mixture of 3 alkaloids and also saponin like bacoside A and B. At the dose of 20 and 40mg/kg; *p.o* possesses significant antidepressant activity in FST and Learned helplessness Test (LTH).²⁴

Clitoria ternatea

This herb is mainly found in tropics. The methanolic extract of the plant showed significant decrease in immobility time in TST.²⁷

Canavalia brasiliensis

The lectins isolated from plant significantly reduced immobility time of male Swiss albino mice in FST.²⁸

Curcuma longa

This plant is commonly known as turmeric and it is native of Southern Asia and mainly cultivated in India, China. The aqueous extract of the plant was found to reduce immobility time in dose dependent manner in a 14 days chronic treatment. Its mode of action is due to inhibition of MAO-A enzyme.²⁹

Cecropia glazioui

Aqueous extract of *Cecropia glazioui* Sneth and butanolic fractions significantly reduced the immobility of rats in FST. The butanolic fractions (Catechin and epicatechin) significantly increased hippocampal monoamines levels and inhibited the uptake of serotonin, dopamine and noradrenaline by synaptosomes of different brain regions.³⁰

Cimicifuga racemosa

It is widely cultivated in temperate Himalayas from Kashmir to Bhutan, Eastern Europe and Siberia. The ethanol-aqueous extract of the plant found to reduce time period of immobility in TST. Hence it has a good antidepressant property.³¹

Gentiana kochiana

Diethyl ether extract of aerial parts of *Gentiana kochiana* at the dose of 20 mg/kg *s.c.* significantly decreased immobility period of mice in FST. Gentiacaulein, the active component of the extract strongly inhibited rat microsomal MAO-A.³⁵

Hypericum reflexum L.

The methanol extract obtained from the aerial part of *Hypericum reflexum* L. fill. was found to decrease in immobility time in forced swimming test.⁴¹

Lepidium meyenii

Aqueous extract of hypocotyls of *Lepidium meyenii* Walp. at the dose of 1g/kg/day, *p.o.* to Swiss female ovariectomized mice for 21 consecutive days, showed significant anti-depressant like activity.⁴³

Magnolia officinalis

The active phytoconstituent such as magnolol and dihydroxydihydromagnolol obtained from the aqueous extract of *Magnolia officinalis* bark, at dose of 50-100 mg/kg, *i.p.* to mice, showed anti-depression like activity.⁴⁶

Morinda officinalis

The ethanol extract and oligosaccharides from plant have antidepressant activity in both mice and rats in FST model. The aqueous extract (50 mg/kg) of the roots showed antidepressant-like activity in male mice in FST model.^{47,48}



Mimosa pudica Linn

This plant is probably native of tropical America and found more or less throughout India. The aqueous extract of leaves of the plant showed decrease immobility time in FST.⁴⁹

Piper methysiticum Forst.

Aqueous extract of the plant root is commonly known as kava- kava and is used as ritual stimulant in south pacific islands. The standardized extract of kava –kava was found to be effective in anxiety and tension. It inhibit MAO-B enzyme and hence used as a psychotropic agent. It also activates mesolimbic dopaminergic neurons.⁵⁸⁻⁶⁰

Rhazya stricta

This plant is mainly found in Arabian Peninsula, Sind, Afghanistan and Baluchistan. It contains some alkaloids like–akuammidine, rhaziminine and tetra hydro secamine, flavonoids like-isorhamnetine etc. The aqueous extract of the leaves of this plant showed antidepressant activity in FST. It is due to inhibition of MAO enzymes both (A and B).⁶⁴

Siphocampylus verticillatus

This plant is native of south Brazil. It contains flavonoids (3 methoxy luteolin), triterpenes (alpha-amiridin and beta-amiridin), steroids (campesterol, beta-sitosterol) .The hydroalcoholic extract of this plant possess antidepressant activity in TST and FST.⁶⁷

CONCLUSION

India has a rich assortment of medicinal plants distributed in different geographical and ecological conditions widespread in the country. Plants have been used since prehistoric times for treatment of various ailments.⁷³ In this review, The few herbal plants have been discussed which are previously explored by the various researchers for their antidepressant activity. By this study, it can be concluded that in the heart of the nature there are still so many plants which are remain to explore and need to study for their therapeutic value, so that they can also be used as herbal medication for betterment of human being. Herbal medications are free from side effects and frequent toxicity unlike the allopathic medicines. So this review is merely an initiation to provide wide options of herbal source for the treatment of depression.

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