

# CNS Stimulant Property of Natural Products – A Systemic Review

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**Abstract:** *The use of herbal medicines world wide has provided an excellent opportunity for India to look for therapeutic lead compounds from ancient systems of therapy. CNS stimulants include caffeine, cocaine, and various amphetamines. They are used to enhance mental alertness and reduce drowsiness and fatigue. This review aims to investigate the CNS stimulant activity of various natural products such as Ginkgo biloba, Bacopa Monnieri, Aswagandha, Acacia Catechu, Acacia Nilotica, Neem, Curcumin, Cucurbita Maxima, Barleria prionitis Linn., Alpinia galanga and Diplazium Esculentum.*

**Keywords:** CNS Stimulants, Ginkgo biloba, Bacopa Monnieri, Aswagandha, Acacia Catechu, Acacia Nilotica, Neem, Curcumin, Cucurbita Maxima, Barleria prionitis Linn., Alpinia galanga and Diplazium Esculentum

## 1. Introduction

Over past few decades, the affinity towards the herbal drugs has been grown by utilization of traditional medicinal plant to heal some critical diseases and it is turning out to be better medicine with respect to synthetic drugs that assure numerous side effects for prolong treatment. Herbal medicines are also in great demand in the developed world for primary health care because of their efficacy, safety and lesser side effects. They also offer therapeutics for age-related disorders like memory loss, osteoporosis, immune disorders, etc. for which no modern medicine is available.

CNS disorders can affect either brain or the spinal cord resulting in neurological or psychiatric disorders. Causes of CNS diseases are trauma, infection, degeneration, autoimmune disorders, structural defects, tumours and stroke, neurodegenerative diseases, mood disorders, schizophrenia and autism [1]. Central nervous system (CNS) stimulants are medicines that speed up physical and mental processes. Central nervous system stimulants are used to treat conditions characterized by lack of adrenergic stimulation, including narcolepsy and neonatal apnoea. The majority of CNS stimulants is chemically similar to the neurohormone, norepinephrine and simulates the traditional "fight or flight" syndrome associated with sympathetic nervous system arousal.

### 1) BACOPA MONNIERI

Bacopa monnieri, also known as Water Hyssop (Brahmi), is prominently used in Ayurveda, a holistic system of medicine originating from India. It is an adaptogen, a physiological agent that naturally increases the body's resistance to physical and emotional stress.[2]

Strengthens adrenal processes that facilitate carbohydrate metabolism. It is a powerful blood purifier and is specific for chronic skin diseases, including leprosy and syphilis, as well as eczema and psoriasis.

#### CNS STIMULANT ACTIVITY

It is the main revitalizing herb for the nerves and the brain cells. The herb is known for its ability to build and improve

mental performance. Improves both short-term and long-term memory. It increases intelligence, longevity, circulation in the brain; it decreases senility and ageing. It fortifies the immune system, both cleansing and feeding it.[3]

### 2) ASWAGANDHA

Ashwagandha (Withaniasomnifera, fam. Solanaceae) is commonly known as "Indian Winter cherry" or "Indian Ginseng". It is one of the most important herb of Ayurveda (the traditional system of medicine in India) used for millennia as a Rasayana for its wide ranging health benefits. It is used for various kinds of disease processes and specially as a nervine tonic.[4]

#### CNS STIMULANT ACTIVITY

It enhances the function of the brain and nervous system and improves the memory. It improves the function of the reproductive system promoting a healthy sexual and reproductive balance. Being a powerful adaptogen, it enhances the body's resilience to stress. Ashwagandha improves the body's defense against disease by improving the cell-mediated immunity. It also possesses potent antioxidant properties that help protect against cellular damage caused by free radicals.[5]

### 3) ACACIA CATECHU

The Acacia catechu is known as Cutch tree, Terra Japonica as well as Black Catechu. In Hindi it is called Khair and Khadira in Sanskrit.

This herb was previously known as Kat or Cacho. This tree was a very important export product that was sent from India to China, Persia and Arabia in the early 16th century particularly. This plant was used majorly for the purpose of dyeing and tanning.[6]

#### CNS STIMULANT ACTIVITY

The extract of heartwood, flowering tops, young shoots, the bark, fruits and the gum of the plant are used to create products for use. These extracts are used as an anodyne, bactericide, refrigerant, detergent, astringent, styptic, masticatory, expectorant, stimulant and as an antiphlogistic. The plant of Acacia catechu contains tannins and Flavonoids

majorly. Catechin and rutin are most important constituents which are free radical scavengers.[7][8]

#### 4) ACACIA NILOTICA

It is a medium sized tree characterized by dark brown or black and longitudinally fissured bark. Leaves bipinnate, petiole 2.5-5 cm long, pinnae in 4-9 pairs, stipular spines, white, sharp and straight. The decoction of bark yields spongy gum which is useful in sore throat, for washing ulcers, to stop bleeding from wounds, skin diseases, as an astringent for diarrhoea and leucorrhoea. Powdered gum is also given in dysentery and diabetes. The fried gum is considered a nutritive tonic, particularly in sexual debility. It also soothes inflamed membranes of the pharynx, alimentary canal and genito-urinary organs. It is prescribed for chest complaints. Pods are used to stop bleeding from bites of leeches. Tender shoots tops are used to treat cough.[9]

#### CNS STIMULANT ACTIVITY

It has Alexeteric, Algicide, Amebicide, Antibacterial, Antiedemic, Antihistaminic, Antinflammatory, Antitussive, Aphrodisiac, Astringent, Decongestant, Demulcent, Expectorant, Hemostat, Hepatotonic, Hypoglycemic, Hypotensive, Lactagogue, Molluscicide, Neurostimulant, Protisticide, Stimulant, Taenicide, Teratologic, Vermifuge activity.[10]

#### 5) NEEM

The beneficial properties of Neem (*Azadirachta indica* A. Juss) have been recognized in the Indian tradition. Each part of the neem tree has some medicinal property. Biswas et al (2002) have recently reviewed the biological activities some of the neem compounds, pharmacological actions of the neem extracts, clinical study and plausible medicinal applications of neem along with their safety evaluation. It is an Anti-inflammatory; Antiarthritic; Antipyretic; Hypoglycaemic; Antigastric ulcer; Spermicidal; Antifungal; Antibacterial; Diuretic; Antimalarial; Antitumour; Immunomodulatory etc.[11][12]

#### CNS STIMULANT ACTIVITY

It contains isoprenoids (like diterpenoids and triterpenoids containing protomeliacins, limonoids, azadirone and its derivatives, gedunin and its derivatives, vilasinin type of compounds and C- secomeliacins such as nimbin, salanin and azadirachtin) and non-isoprenoids, which are proteins (amino acids) and carbohydrates (polysaccharides), sulphurous compounds, polyphenolics such as flavonoids and their glycosides, dihydrochalcone, coumarin and tannins, aliphatic compounds, etc. Varying degrees of central nervous system (CNS) depressant activity in mice was observed with the leaf extract. Fractions of acetone extract of leaf showed significant CNS depressant activity.[13]

#### 6) CURCUMIN

Curcuma longa, a perennial herb of the Zingiberaceae (ginger family), contain curcuminoids and curcumin. Turmeric is used as a spice in curry powders and mustard. It is being investigated in clinical trials for the treatment and prevention of cancers, particularly of the GI tract, and for treatment of colitis and Alzheimer and Huntington diseases.[14][15]

#### CNS STIMULANT ACTIVITY

Rhizomes of *Curcuma longa* Linn. have been used to treat depression in past. Curcumin is low molecular weight polyphenol, is considered as active principle of *Curcuma longa* Linn. *Curcuma longa* Linn. is reported to have antioxidant, antiepileptic and neuroprotective properties.[16-18]

#### 7) CUCURBITA MAXIMA

*Cucurbita maxima* is a short lived shrub which belongs to family Cucurbitaceae. Seeds are traditionally used as a bitter tonic, oil obtained used in debility nervous disorders.

#### CNS STIMULANT ACTIVITY

*Cucurbita maxima* has a potential CNS stimulant effect that can be explored for therapeutic advantage as an alternative treatment in medical conditions associated with dizziness and sedative.[19]

#### 8) BARLERIA PRIONITIS LINN.

*Barleria prionitis* Linn. (Acanthaceae) is widely distributed throughout India, Sri Lanka, Africa and tropical Asia. The crude extract of this plant is commonly used to treat whooping cough. The plant extract acts as diaphoretic and expectorant. The plant has also anti-respiratory syncytial virus, anti-arthritic, anti-inflammatory and anti-fertility activities. The leaves and the tender branches are used for treatment of toothache, strengthening of gums, whooping cough and premature ejaculation. Whole-plant extracts contain iridoid glycosides, barlerin and verbascoside, which have shown potent activity against respiratory syncytial treating fever and several respiratory diseases.[20]

#### CNS STIMULANT ACTIVITY

The ethanol extract of *Barleria prionitis* exhibit antidepressant activity.

#### 9) ALPINIA GALANGA

The plant *Alpinia galanga* (Zingiberaceae) is a herb primarily used in cooking. It is widely distributed in various parts of India and Southeast Asia. It is 5 feet long with narrow leaves. The rhizome has the pharmacological actions such as antitumour, antifungal, antiulcer, antiallergic, antibacterial and antiviral activities. It is used for cough, asthma, bronchitis, headache, inflammation, rheumatoid arthritis etc.[21]

#### CNS STIMULANT ACTIVITY

It has kampheride, alpinin, galangin, methyl cinnamate, cinchon and tannins like phlobaphenes, flavonoids terpenoids and saponins which acts against CNS disorders.

#### 10) DIPLAZIUM ESCULENTUM

The vegetable fern plant (*Diplazium esculentum*) is a species found and used in East to South Asia and Oceania. It is a cold sensitive plant suitable for the warmer regions and tender to freezing temperatures. *Diplazium esculentum* (Retz.) Sw (Family Athyriaceae) consists of creeping and branched rhizome; scales brown, lanceolate and upto 7 to 15 mm in length; stripes fragile, straw coloured, 10-35 cm long.[22-26]

#### CNS STIMULANT ACTIVITY

The rhizome is considered as strong haemoptysis, used in cough, asthma, phthisis, fever, dyspepsia, stomachache, diarrhea and as antidiarrhetic, insect and pest repellent. [27] Young tips of fronds are used as tonics for health. Decoction of rhizome and young leaves are useful haemoptysis and constipation and used as antibacterial. It is found to be a good CNS stimulant. [28]

#### 11) GINKGO BILOBA

Referred to as *yínxíng* in Chinese medicine, the leaves of the ginkgo tree have long been used by herbalists for their effects as a brain tonic helpful for improving memory and the ability to concentrate. As a blood vessel dilator, it works directly with the circulatory system to increase oxygen supply to the brain and is additionally supportive to the heart and lung meridian systems.

#### CNS STIMULANT ACTIVITY

Ginkgo is known primarily for its beneficial effect on circulation, and it is through this function that it increases the energy of those taking it. At the same time, it can actually increase the oxygen capacity of the blood and improve mood. [29] It has also been shown to be very beneficial for those with early-stage Alzheimer's disease. It improves the vision of those with normal tension glaucoma.

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