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Memory booster herb (natural cognitive enhancers): An overview

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Abstract

The main important aspect to differentiate from one individual to other human beings is Memory as it is important to recognize individual self. There are three basic forms of memory which allow the brain to encode, store, and retrieve. Without these basic forms of memory, individual even fails to build personal rapport, to acquire new knowledge, and unable to do basic functions of daily life. From last decades, Indian and Chinese cultures took interest for natural remedies by developing various traditional medicines from herbs for the declining activity of cognition, reverse memory loss and to increase learning power. Nootropic herbs are famous for brain acting herbs and smart drugs called from its isolated constituents as it helps to enhance circulation of blood in the brain. This Review focuses on natural agents and Herbs which act as memory boosters.

Keywords: Memory, herbs, Cognitive, enhancers, Memory enhancing herbs, improving memory, Brain booster

1. Introduction

The ability to record events, information and stimuli over a period of time is called as memory as in today's stressful scenario, memory is a very important aspect for recalling events, information, and experiences but due to certain condition as stress, negative emotions lead to various diseases such as amnesia, memory loss, high blood pressure, anxiety and some serious life treats in which person is unable to use his mind power as schizophrenia and Alzheimer's diseases. So, With the last decades, to overcome these disease herbs and natural remedies are very useful to promote intelligence as Medhya herbs which are related to our cortical centre of brain in nervous system and Nootropic herbs which is developed by The Indian System of Medicine Ayurveda "The herbs acting on the brain" and its isolated constituents called as smart drugs. Ayurveda says, three powers of the mind is triad of intelligence - the acquisition, the retention and the recollection as the Power of Acquisition means to know something new, to analyze or understand, The Power of Retention is second power of mind which has the capacity to retain what has been grasped or understood as short-term memory, and the third triad of intelligence is the Power of Recollection which means to retrieve the information after some time which is called as long-term memory^[1, 2].

2. Scientific Documentation of Herbs

There are various plants which have the ability to recover cognitive disorder like Alzheimer's disease (AD) and other memory-related disorders are practised in traditional medicine as alkaloids from plants have numerous benefits over the side-effects with pharmaceutical interaction. Cognition potential can be enhanced through various type of herbs as Bacopa moniera (Bramhi), Ginkgo Biloba, Shankpushpi etc.^[1]

3 Herbal Drugs for Cognition Enhancement

3.1 Ginkgo Biloba (Ginkgoaceae)

Ginkgo Biloba (Ginkgoaceae) is called as ginkgo, Kew tree, maidenhair tree, and yinhsing. In Ginkgo leaf, some constituents have existed as Flavonoids (quercetin, kaempferol, and isorhamnetin), Minor Flavonoids dehydrocatechins (proanthocyanidins), catechins, flavones (eg, ginkgetin, amentoflavone, bilobetin, sciadopitysin) and terpene ginkgolides A, B, C, J, and

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M and bilobalide. Ginkgo Biloba acts as an antioxidant by removing free radicals and helps to increase oxygen supply, impairment in the elderly population and improve behavioural adaptation for memory enhancement. The vitro study indicates that Ginkgo extract has an anti-amyloid effect. Ginkgo biloba extract also increases transthyretin RNA levels which are a part of beta-amyloid transport mechanism which protects from amyloid deposition in brain [2].

3.2 *Bacopa Monniera* (Scrophulariaceae)

From the Scrophulariaceae family, *Bacopa monniera* is one of the members of this family. It is called by different name in a different language as in Hindi Brahmi-sak, Nir-Brahmi, Brahmi in Sanskrit, Jalanimba in Bangali[36]. The *Bacopa monniera* (BM) is found in wetlands and muddy shores whose stem is 10-30 cm long, 1-2 mm thick, soft, Leaves 0.6-2.5 cm long and 3-8 mm broad, sessile. Triterpenoid saponins are also known as Bacosides responsible for memory enhancement [3].

3.3 *Centella Asiatica* (Umbelliferae)

Mandukparni is another name of *Centella Asiatica* (L) Urban (Umbelliferae/Apiaceae family). In India, it is used for spices or grown as a vegetable and herbal formulation as a tonic which is used to increase memory power, immunity booster, anti-stress substance, anti-epilepsy and anti-anxiety. *Centella asiatica* acts as anti-oxidant against lead acetate induced neurotoxicity, amnesia and ideas recalling. In early postnatal developmental stages, *C. asiatica* can produce long-lasting beneficial effects on mouse brain by mediating effect on the cholinergic system and neuronal morphology and also improve the endogenous antioxidant enzymes in the rat brain [3, 4].

3.4 *Acorus Calamus* (Acoraceae)

In the Himalayas, it is cultivated at an altitude up to 6000 feet, *Acorus calamus* is scientific name of Vacha (Hindi name) which is used as a brain tonic in Indian and Chinese herbal traditions. For effective supplements, stem, roots and leaves are used by herbal experts. In traditional Medicine Sweet flag (*Acorus calamus*) is called a drug from the Acoraceae family. The scented leaves and rhizomes of the sweet flag are used as a flavour in spices and in medicines. It is mainly propagated by vegetative means and in demand because of various uses of the plant. *In vitro* method, *Acorus calamus* has germplasm conservation for benefits in the medicinal market. Vacha is helpful to treat nervous disorder as helps in concentration, thinking process, brain tissue detoxification. It acts as Intellect promoter, Antidepressant, Neuroprotective, Digestive stimulant, Nootropic, Nervine stimulant, Muscle relaxant, Antibacterial Anti Inflammatory. Vacha herb is an effective herb for giving benefits in mental focus and concentration for students, musicians, mediators, researchers, in their work [2, 5].

3.5 *Evolvulus Alsinoides* L. (Convolvulaceae)

In the Himalayas, *Evolvulus alsinoides* (EA) is found at 6000 ft from family Convolvulaceae called in common language as Shankhpuspi in Ayurveda which is famous for its therapeutic values for treating nervous debility, increase in memory, epilepsy. It is used as brain tonic by inculcating the whole herb of 'Shankhpushpi' for memory potentiating, tranquillizing properties and anxiolytic properties. Extracts of *Evolvulus alsinoides* as ethyl acetate, aqueous and Ethanollic have been seen antibacterial and anthelmintic properties and also to increase learning process and memory retention in rats [2, 6].

3.6 *Caesalpinia Crista* Linn. (Caesalpinaceae)

Kat-takaranja is the common name of *Caesalpinia crista* (Lin.) in Hindi and sagargota in Marathi belongs to family Caesalpinaceae found in India and Srilanka. Plant seed consist of starch, saponin, bonducin, an enzyme proteins, sucrose, two phytosterols namely sitosterol and hepatsane, fatty acids such as palmitic acid, stearic acid, lignoceric, oleic, linolenic acid and seed kernel consist of furanoditerpenes- α -caesalpin, β -caesalpin, γ -caesalpin, δ - caesalpin, ϵ -caesalpin, and F-caesalpin. Ethanollic extract of dried seed kernel of *Caesalpinia crista* Lin. enhances learning and memory activity, impairment induced by scopolamine and these effects are mediated in part by inhibition of AChE activity in the brain. It acts as antidiabetic, antiproliferative, adaptogenic, antimicrobial, anti-filarial, uterus contractility, hepatoprotective, antitumor, and antioxidant activities [3, 7].

3.7 *Tinospora Cordifolia* (Menispermaceae)

Amrita or Guduchi, Giloe is Hindi name of *Tinospora cordifolia* (Wild.) Miers ex Hook.F. & Thoms. from family Menispermaceae at tropical Indian altitude 300m. In Indian system of Medicine (ISM), Amrita is an important drug which is used in medicine as rejuvenator or adaptogen, antioxidant, immunomodulatory, anti-inflammatory, anti-hyperglycaemic, antispasmodic, antiulcer and antistress properties for treating depression, Alzheimer disease, improving cerebral ischaemia, and attention-deficit hyperactivity disorder, oxidative stress injury and regulation of cytokines, memory enhancement by inhibiting reuptake of amines in brain and increased levels norepinephrine (NE), serotonin (5-hydroxytryptamine or 5-HT), dopamine (DA), and decreased levels of gamma-aminobutyric acid (GABA) have been demonstrated. In herbal preparations, *Tinospora cordifolia* works synergistically for making the important component of polyherbal formulations for treating depression and various diseases [2, 6, 8].

3.8 *Zingiber Officinale* (Zingiberaceae)

In the family Zingiberaceae, Ginger or *Zingiber officinale* is found in Asian, Indian, and Arabian folklore used as medicine and spices. Ginger, gingerol, shogaol and zingerone are active forms of *Zingiber officinale*. 6-gingerol is active component inhibits cholinesterase activity by increasing acetylcholine (ACh). It consists of pharmacological properties including antilipidemic, antiemetic, anti-inflammation, and anti-arthritis antioxidant activity[34]. It helps in memory enhancement by Arabian folklore. And also increases norepinephrine, epinephrine, dopamine and serotonin contents in the cerebral cortex and hippocampus [2, 6, 9].

3.9 *Ilex Paraguariensis* (Aquifoliaceae)

Yebra mate tea (mate) leaves is common name of *Ilex Paraguariensis* from family Aquifoliaceae which is grown at elevation of up to 8-15 mas petioles are 15 mm long and olive-green leaves are 8 cm long as, obovate, perennial, alternate, coriaceous, little crenate dentate margins and obtuse apex, with wedge-shaped. In springs season, flowers have been produced with 4 white petals and In tropical or subtropical species, 5, 6 or 7 petals. Extracts of *Ilex paraguariensis* green (non-roasted) have flavonoids, purine alkaloids (methylxanthines), chlorogenic acid, vitamin A, B complex, C and E, tannins, and mate saponins which is derived from ursolic acid also known as triterpene saponins. It helps in treating dementia, social recognition task, locomotor activity and inhibitory avoidance task methods [1, 10].

3.10 *Huperzia Scururus* (Lycopodiaceae)

In Argentinian traditional medicine *Huperzia Scururus* (Lam.) Trevis. (Lycopodiaceae) is used majorly for the increase in memory and aphrodisiac. It is found in a northwest region of the country to the sierras of the centre (C'ordoba), south of Buenos Aires and in South American and African countries. It consists of two constituents as huperzine A and B which are from lycopodium alkaloids for learning and memory retention and for Alzheimer's disease and myasthenia gravis [1, 11].

3.11 *Commiphora Wightii* (Burseraceae)

In Family Burseraceae, *Commiphora wightii* is known as Guggal, Guggul or Mukul myrrh tree is a flowering plant. It has a maximum 4 m height with thin papery bark. Steroid Guggulsterone is active ingredients in *Commiphora* which work as an antagonist of the farnesoid X receptor. For improving memory, Guggulipid showed potential cognitive enhancer in scopolamine-induced memory deficits. choline acetyltransferase is decreased by acting on in learning and memory by *Commiphora Wightii* acting on impairment in learning and memory in hippocampus [1, 12].

3.12 *Emblica Officinalis* (Euphorbiaceae)

Amla, The Indian gooseberry is Hindi name of *Emblica Officinalis* from family Euphorbiaceae known for edible fruits. It increases memory by improvement in memory in scopolamine and diazepam-induced memory deficits. AChE activity inhibits by *Emblica Officinalis*. Major active constituents are found in amla are Vit-C, phyllembin, vitamin c helps to decrease in cholesterol, memory enhancement, and anticholinesterase activity for young and aged rats, amla churna produced a dose-dependent increase in memory. scopolamine and diazepam reversed the amnesia. For management of Alzheimer's disease, amla churna has beneficial effects such as enhancement and reversal memory deficits [1, 13].

3.13 *Salvia Lavandulaefolia* (Lamiaceae)

From family Lamiaceae, *Salvia Lavandulaefolia* has various beneficial effects for memory disorder, cerebral ischemia, depression, anticholinesterase activity. It consists of luteolin, 1, 8- cineole, α - and β -pinene, carvacrol, antioxidants and essential oils. In dementia, *Salvia Lavandulaefolia* inhibits the acetylcholinesterase and enhancement in memory [1, 14].

3.14 *Foeniculum Vulgare* (Umbelliferae)

Foeniculum vulgare Linn. Is from family Umbelliferae. In Mice, nootropic and anticholinesterase agent are used as extracts F. Vulgare which inhibits acetylcholinesterase and increased step- down latency significantly. For treatment of dementia and Alzheimer's disease, F. vulgare has been used [1, 15].

3.15 *Magnolia Officinalis* (Magnoliaceae)

From mountains and valleys of China to native Magnolia, *Magnolia Officinalis* is produced at altitudes of 300-1500 m to 20m height has thick bark in brown colour. Houpu Magnolia is the common name of *Magnolia Officinalis*. In traditional Chinese medicines, *Magnolia Officinalis* have bioactive constituents such as Magnolol, honokiol, and obovatol for the treatment of neurosis, memory enhancement, anxiety, and stroke. In rat spleen microsomes and human polymorphonuclear leukocytes, magnolol and honokiol exhibited an AChE inhibitory property [1, 6].

3.16 *Lepidium Meyenii* (Brassicaceae)

Maca is the common name of *Lepidium Meyenii* from family Brassicaceae. It is found in Bolivia and high Andes of Peru. Extracts of Black Maca as Aqueous and hydroalcoholic ameliorated the scopolamine-induced memory impairment in mice. cholinergic dysfunction mainly neurotransmitter (ACh) act by *Lepidium Meyenii* for memory enhancement and learning. Malondialdehyde (MDA) levels and acetylcholinesterase (Ache) levels decreased by Black maca (0.5 and 2.0 g/kg) in the brain and in ovariectomized mice and no difference in acetylcholinesterase (Ache) levels. Thus, this herb shows improvement in learning and memory [1, 16].

3.17 *Rosa Alba* (Rosaceae)

Rosa Alba from family Rosaceous consists of memory increasing property by producing symptomatic improvement. It was helpful in memory restorative agent for the cognitive disorder. By using elevated plus- maze and passive-avoidance test, *Rosa alba* has effects on learning retention and memory enhancement by inhibiting cholinesterase. It was helpful in appetite, cold, leprosy, biliousness burning sensation, headache, ophthalmia, rheumatism [1, 6].

3.18 *Thespesia Populnea* (Malvaceae)

From Malvaceae, *Thespesia populnea* found in the tropical regions and coastal forests of India. For testing memory, Exteroceptive behavioural models served by Elevated plus-maze and Hebb-Williams maze and interceptive behavioural models served by Diazepam-, scopolamine-, and ageing-induced amnesia. It decreases Cholesterol level, anti-inflammatory, anticholinesterase, and antioxidant properties of *T. populnea* for memory-enhancement effect and also for the management of Alzheimer patients. In mice, increased cholesterol level and decreased cholinergic transmission produced by *T. Populnea* for dementia in Alzheimer a development of amyloid plaque [1, 6].

3.19 *Sesamum Indicum* (Pedaliaceae)

In Herb family of Pedaliaceae, *Sesamum Indicum* commonly known as Sesame which is cultivated for edible seeds in tropical regions grow in pods. In sesame seeds, lignan glycosides are most abundant Sesaminol glycosides. Protective effect against A β - induced learning, memory deficits are shown by Dietary sesaminol in the Morris water maze test. Vitamins, (Thiamine, Niacin), protein, oleic, linolenic acids carbohydrates, nicotinic acid, vitamin C, and pantothenic acid are major constituents by *Sesamum Indicum*. sesamin and sesaminol are main lignins found in sesame oil which is responsible for antioxidant activity. It is helpful in many diseases such as diuretic, emmenagogue, lactagogue, and cough are treated by Sesamum seeds and amenorrhoea and dysmenorrhoea are treated by powdered seeds [1, 16].

3.20 *Salvia officinalis* (Lamiaceae)

Salvia officinalis is commonly known as Sage which is used by the Egyptians as a fertility drug for treating wounds, snake bites, ulcers, coughs, insect, fevers, digestive problems, sores, vaginal infections, diarrhoea, sore throats. In British herbal encyclopaedias, Sage (*Salvia*) has been used for an increase in memory widely used in the kitchen and medicinally thought centuries. In one study, acetylcholinesterase (AChE) activity inhibits by Sage (*Salvia*) for treating mild to moderate Alzheimer's disease by the breakdown of a chemical called acetylcholine which is deficient in Alzheimer's patient. It also showed an important effect on behaviour and attention [1, 6].

4. Magnitude of memory herb in dietary supplements market

The global dietary supplements industry was valued at USD 96 billion in 2017, and it is accepted to reach USD XX billion by 2023, at a CAGR of 6.9%, during the forecast period. The dietary supplements business is preliminarily focused by the paradigm shift toward preventive health management practices amid growing healthcare costs and increasing burden of lifestyle diseases. Digitization in retail is expected to boost the future growth of dietary supplements. Memory herb widely use now day in form of dietary supplements ^[17].



Ginkgo biloba



Green tea



Ashwagandha



Sage

Sources: <https://www.healthegyan.com/7-best-herbs-for-memory-boosting/>^[18]

5. Conclusion

In many centuries, our country has a rich diversity of Ayurvedic herbs which have various medicinal properties but modern medicine take markets over traditional medicine

which are expensive and usage side-effects. So, to combat modern medicine, ayurvedic herbs have been seen as an effective strategy for memory enhancement as herbs can be used in the kitchen and pharmaceutically. This review article lays emphasis on Ayurvedic herbs for memory enhancement and treatment for dementia. Dementia is a neurological syndrome which mainly results in impairment in memory, thinking and judgement capabilities. With profound research, drug efficiency and molecular basis of medicinal properties can be established with evidence-based medicines that can easily incorporate herb molecular basis.

6. Conflict of interest: The author(s) declare(s) that there is no conflict of interest.

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