

(REVIEW ARTICLE)



A review: Ethanopharmacological review of native traditional medicinal plants as a memory booster

Punam V. wankhade ^{1,*}, Vinayak A. Katekar ² and Swati Deshmukh ²

¹ Department of Pharmacy, Shraddha Institute of Pharmacy, Washim, Maharashtra, India.

² Department of Quality Assurance, Shraddha Institute of Pharmacy, Washim, Maharashtra, India.

GSC Biological and Pharmaceutical Sciences, 2023, 25(01), 231–244

Publication history: Received on 06 September 2023; revised on 16 October 2023; accepted on 19 October 2023

Article DOI: <https://doi.org/10.30574/gscbps.2023.25.1.0422>

Abstract

Memory is the most significant distinction in separating one individual from another since it helps us identify ourselves as distinct individuals. The following are the three main types of memory that the brain is capable of storing, retrieving, and capturing. Without these core types of memory, a person even finds it difficult to build relationships, pick up new skills, and carry out the most fundamental activities of everyday living. There are numerous traditional medicinal plants that are frequently used to improve memory. These plants include *Rhodiola rosea*, *Ginkgo biloba*, *Withania somnifera*, *Bacopa monnieri*, and others. Such plants' ability to improve memory is primarily related to their active phytoconstituents. These ingredients are also known as "smart drugs." These can pass across blood-brain barriers. By acting on memory to make the brain more awake and focused, they also improve cognitive function. They have memory-enhancing qualities that improve the brain's ability to coordinate its neurons. The purpose of this paper is to discuss the pharmacology, phytochemistry, and clinical uses of traditional medicinal plants as memory enhancers.

Keywords: Memory; Herbal remedies; Improving memory; Brain booster

1. Introduction

Memory is a typical outcome of learning and illustrates the long-lasting changes in the neurological system brought on by brief experience. 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. Memory is the ability to store events, information, and stimuli over time. In today's stressful world, memory is crucial for remembering past experiences. However, stress and other negative emotions can cause a number of illnesses, including amnesia, memory loss, high blood pressure, anxiety, and serious conditions like schizophrenia and Alzheimer's, which prevent a person from using their mental faculties. In order to combat these diseases, natural medicines include Medhya herbs, which are associated to our nervous system's cortex center of the brain, and Nootropic herbs, established by the Indian System of Medicine Ayurveda, have become increasingly important. Memory is the capacity to store events, and stimuli over an extended

* Corresponding author: Punam V. wankhade

period of time. However, in today's stressful world, stress and negative emotions can cause a number of illnesses, including amnesia, memory loss, high blood pressure, anxiety, and some serious conditions that prevent a person from using their mental faculties, such as schizophrenia and Alzheimer's. In order to combat these diseases, natural medicines include Medhya herbs, which are associated to our nervous system's cortex center of the brain, and Nootropic herbs, established by the Indian System of Medicine Ayurveda, have become increasingly important.



Figure 1 Natural memory booster enhancing brain power

2. Anatomy and physiology of brain

2.1. An overview

The brain, a miraculous three-pound organ, is responsible for all bodily processes, interprets data from the outside world, and embodies the mind and soul. The brain controls a wide range of functions, including memory, creativity, emotion, and intelligence. The brain is made up of the cerebrum, cerebellum, and brainstem and is protected inside the skull.

Our five senses—sight, smell, touch, taste, and hearing—all convey information to the brain, frequently several at once. It puts the signals together in a way that makes sense to us and can help us remember that information.

The brain regulates various bodily functions, including our thinking, speech, memory, and arm and leg movement. The brain structure is composed of three main parts: the forebrain, midbrain and hindbrain, each with multiple Parts.

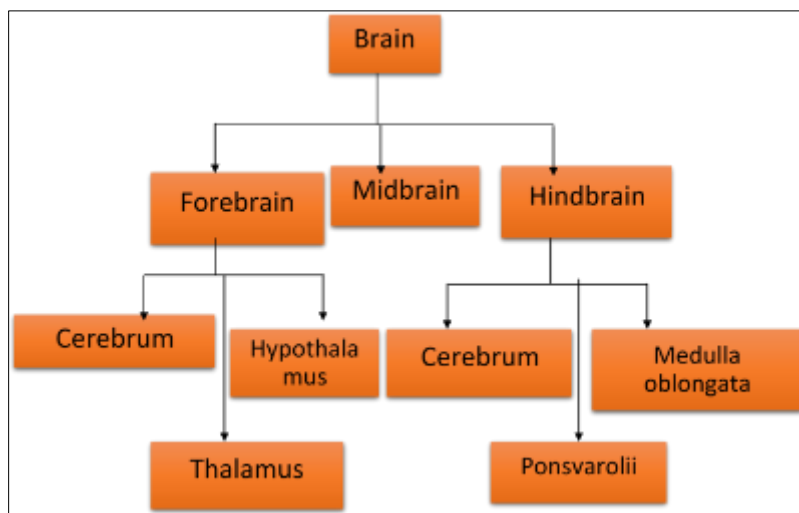


Figure 2 Parts of brain

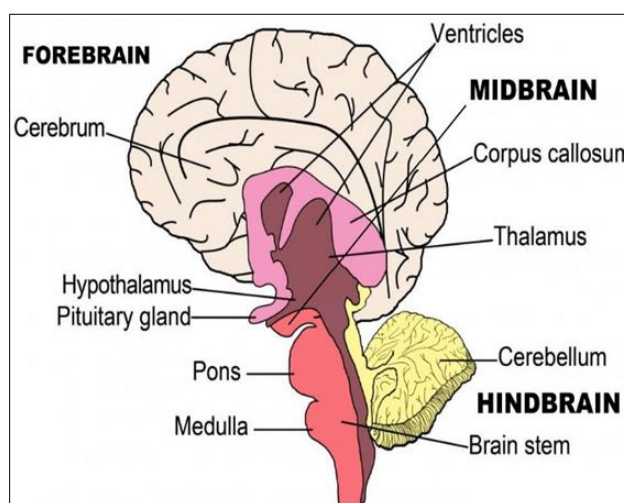


Figure 3 Structure of human brain

2.2. Forebrain

2.2.1. The cerebellum

Sometimes referred to as the Cerebral Cortex, is the biggest component of the human brain and is responsible for higher-order mental processes including cognition and action. The gray surface, slightly thicker than our thumb, is made of nerve cells.

Signals are transferred between nerve cells in different regions of the brain and body by white nerve fibers that are below the skin.

The neocortex, a six-layered structure present in animals, has a wrinkled surface that enhances its surface area. There are four “lobes” that make up this division.

The frontal lobe, parietal lobe, occipital lobe, and temporal lobe are among them. mind lobes

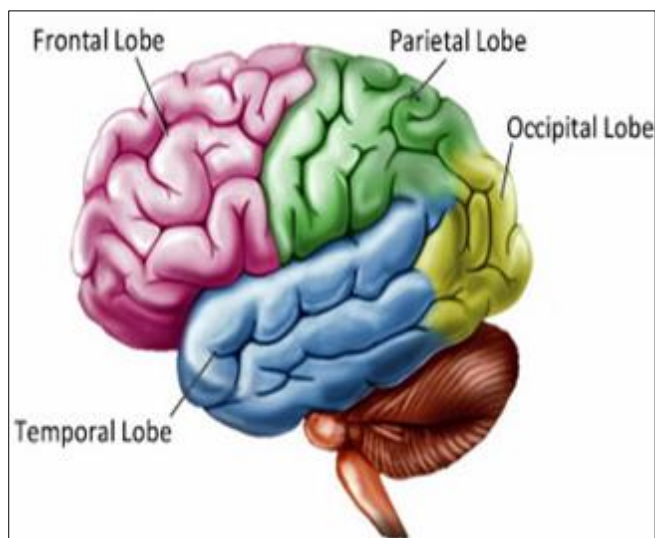


Figure 4 Structure of forebrain

2.2.2. Uses for the Lobes

Frontal Lobe

The frontal lobe, which is located just below the forehead, is thought to be responsible for our capacity to reason, organize, plan, speak, move, make facial expressions, perform sequential tasks, solve problems, control inhibition, be spontaneous, initiate and self-regulate behaviors, pay attention, remember details, and regulate our emotions.

Parietal Lobe

The parietal lobe, which is in charge of sophisticated behaviors and senses like vision, touch, body awareness, and spatial orientation, is situated in the upper back of the brain. It is crucial for the integration of sensory data from multiple body areas, for understanding relationships between numbers, and for manipulating objects. Our visual-spatial processing, language understanding, the capacity for construction, bodily placement and movement, neglect and inattention, left-right distinction, and self-awareness/insight are some of the areas that are affected.

Occipital Lobe

The occipital lobe, which is found in the back of the brain, is involved in processing visual information. This includes visual attention, visual identification, spatial analysis (movement in a three-dimensional environment), and the ability to see body language such as postures, expressions, and gestures

The temporal lobe

Which is close to our ears, is involved in processing verbal memory, visual memory, language production (including fluency and word-finding), general knowledge, and autobiographical memories. This includes understanding spoken language, verbal memory, visual memory, and language production (including fluency and word-finding).

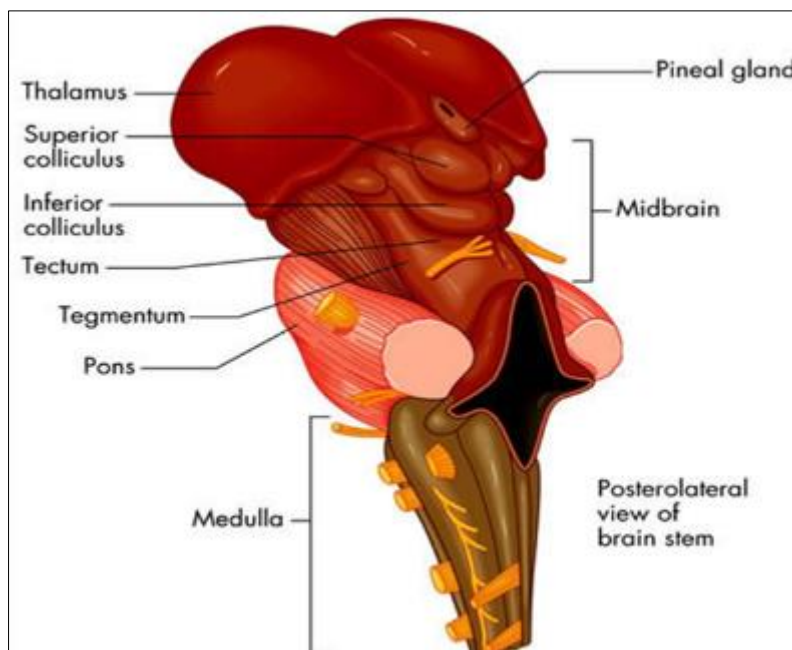


Figure 5 Part of hindbrain

2.3. Midbrain

The midbrain is situated close to the center of the brain, above the hindbrain and under the cerebral cortex. The tectum, tegmentum, cerebral aqueduct, cerebral peduncles, as well as a number of nuclei and fasciculi, make up this structure. Our visual and auditory systems use the midbrain as a sort of relay station, which is its main function. The substantia nigra and red nucleus, two regions of the midbrain that are involved in the regulation of bodily movement, are home to a significant number of dopamine-producing neurons. Parkinson's disease is linked to the substantia nigra's neuronal degeneration. The midbrain, the tiniest part of the brain, is situated in the middle of the cranial cavity.

2.3.1. The limbic system

Sometimes known as the "emotional brain" or "childish brain," is a popular term for it. The thalamus, hypothalamus, amygdala, and hippocampus are located there, which is buried within the cerebrum

Thalamus

The thalamus' main function is to transmit sensory data from other regions of the brain to the cerebral cortex.

Hypothalamus

The primary role of the hypothalamus is to regulate various functions of the pituitary gland and endocrine activity, as well as somatic functions e.g. body temperature, sleep, appetite.

Amygdala's

Main function is to act as a crucial processor for the senses. It is linked to the hippocampus and is involved in memories that are emotionally charged. It also has a large number of opiate receptor sites that are linked to sensations of fury, fear, and sexual desire.

Hippocampus

The hippocampus is primarily responsible for forming, organizing, and storing memories. It plays a crucial role in creating new memories and tying sensations like scent and sound to emotions and memories.

Pituitary Gland

The primary role of the pituitary gland is an important link between the nervous system and the endocrine system. It releases many hormones which affect growth, metabolism, sexual development and the reproduction system. It is

connected to the hypothalamus and is about the size of a pea. It is located in the center of the skull, just behind the bridge of the nose.

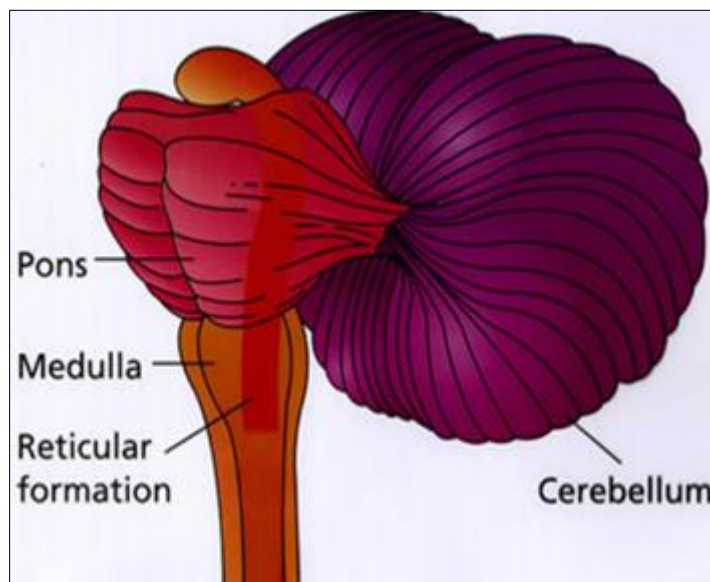


Figure 6 Structure of midbrain

2.4. Hindbrain

2.4.1. Cerebellum

The cerebellum, or “little brain”, is similar to the cerebrum with its two hemispheres and highly folded surface. It is associated with regulation and coordination of movement, posture, balance and cardiac, respiratory and vasomotor centers.

In the cerebellum With two hemispheres and a surface that is heavily folded, the cerebellum, sometimes known as the “little brain,” resembles the cerebrum. It is linked to the control and synchronization of cardiac, respiratory, and vasomotor centers as well as movement, posture, and balance.

Brain Stem: The limbic system is situated above the brain stem. It controls crucial bodily processes like breathing, pulse, and blood pressure. The midbrain, pons, and medulla make up the brain stem.

2.4.2. Pons

The pons’ main function is to act as a link between the cerebellum and cerebrum and other regions of the neurological system. Numerous significant nerves have their origins in the pons, including the trigeminal nerve, which senses sensations in the face and controls the muscles that bite, chew, and swallow. It also houses the vestibulocochlear nerve, which enables hearing, and the abducens nerve, which enables humans to see side to side. The lower pons, which is a portion of the brainstem, stimulates and regulates the intensity of breathing, whereas the upper pons reduces the depth and frequency of breaths. Additionally, the pons is linked to the regulation of sleep cycles.

2.4.3. Medulla

Our involuntary life-sustaining activities, such as breathing, swallowing, and heart rate, are primarily regulated by the medulla. It assists in the transmission of neural signals to and from the brain and spinal cord as part of the brain stem. It is situated where the spinal cord and brain meet.

3. Scientific evidence regarding the herb

Traditional medicine uses a variety of plants with the potential to treat cognitive disorders including Alzheimer’s disease (AD) and other memory-related illnesses since plant alkaloids have several advantages over the negative effects associated with drug interactions. A variety of plants, including *Ginkgo biloba*, Shankhpushpi, and *Bacopa moniera* (Bramhi), can improve cognitive capacity. Traditional medicine uses a variety of plants that can treat cognitive problems

including Alzheimer’s disease (AD) and other memory-related illnesses since the alkaloids in plants have several advantages over the adverse effects of drug interactions. Various types of herbs, such as Bacopa moniera (Bramhi), Ginkgo Biloba, Shankhpushpi, Ashwagandha, etc., can improve cognition potential. These herbs have been understudied since the 1950s for preventing stroke and age-related loss in brain function. Vinpocetine was just recently made accessible in the United States, where it is sold as an over-the-counter nutritional supplement rather than a prescription medication like it is in Europe. Memory loss can be greatly avoided because to the anti-inflammatory properties of the spice curcumin. The main ingredient that gives yellow curry its vibrant color is curcumin, which is also commonly used as a natural food coloring. In biological terms, brahmi is an ayurvedic herb also known as *bacopa monniera*. It has been used for a very long time to enhance mental performance and memory. Eat more B vitamins if you wish to maintain mental clarity. According to experts, future cognitive issues could be brought on by deficiencies in the B vitamins B6 and B12, niacin, and thiamin. These B vitamins can be found in pork, potatoes, bananas, shellfish, fortified cereals, potatoes, bananas, and banana juice. All of the necessary B vitamins are included in various dietary supplements. The “neuroprotective compound” and “short-term memory enhancer” N-acetyl-Lcarnitine.

3.1. Brain Specific Roles of B-Vitamins

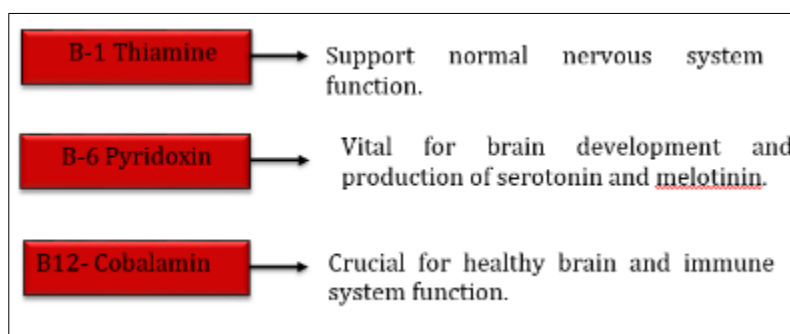


Figure 7 Roles of vitamins B

4. Natural memory enhancer

4.1. Herbs and nutrients

Natural supplements that some people believe will improve your memory include ginkgo biloba, the vitamin phosphatidylserine, which is found in soybeans, and pregnenolone, a hormone that naturally occurs in the body.

They are thought to work together to boost brain oxygenation, reduce free radicals, and promote neural growth.

4.2. Food

Some individuals suggest pregnenolone, a hormone that naturally occurs in the body, ginkgo biloba, and phosphatidylserine, a vitamin found in soybeans, as natural supplements that can improve memory. They are thought to work together to boost brain oxygenation, reduce free radicals, and promote neural.

4.3. Physical exercise

According to some researchers, working out your brain will improve your memory. Take a shower without looking in the mirror, complete the Sudoku or crossword puzzles in the morning newspaper, or enroll in a class to learn something new.

These biological memory boosters may lessen memory loss and even partially restore some of it when used alone or in combination.

4.4. Rest

Maintaining physical and mental well-being requires both sleep and relaxation.

The brain receives less sensory input while you’re sleeping, allowing it to organize events and activities and preserve memories.

4.5. A the topic of mental health check list for better memory contains the items on this list

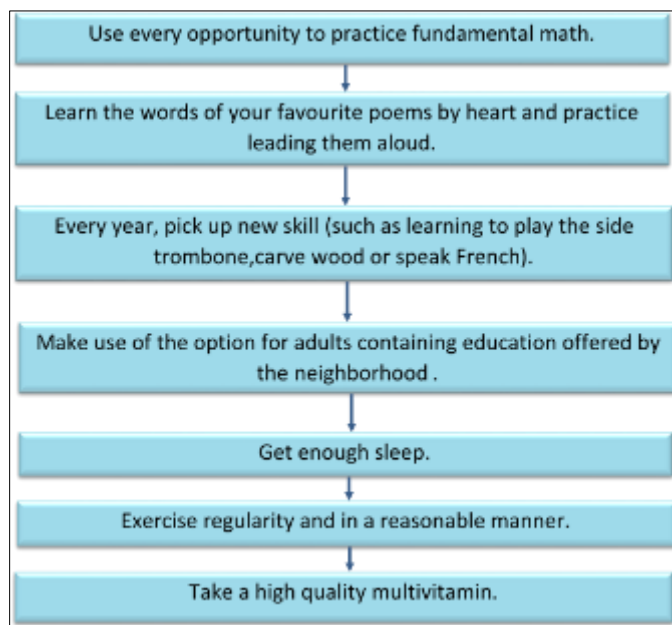


Figure 8 List for better memory

5. Herbal remedies that boost memory:

5.1. *Ginkgo Biloba* (family Ginkgoaceae)

A member of the Ginkgoaceae family, Ginkgo Biloba is also known as the Kew tree, maidenhair tree, and yinhsing. Some of the elements found in ginkgo leaves include flavonoids (such as quercetin, kaempferol, and isorhamnetin), minor flavonoids (proanthocyanidins), catechins, flavones (such as ginkgetin, amentoflavone, bilobetin, and sciadopitysin), and terpene ginkgolides A, B, C, J, and T.G. biloba is also known by the common names Ginkgo, Salisburia Adiantifolia, Ginkyo, Yinhsing, Fossil Tree, and Ginkgo Folium. It belongs to the Ginkgoaceae genus of plants. There is only one species of this tree left in the world.

This plant has some living examples that could be up to 3000 years old. The Ginkgo tree doesn't begin to reproduce until it is around 20 years old, and it doesn't stop until it is 1000 years old. Ginkgo has long been used in traditional Chinese and Japanese medicine. The Ginkgo tree has also shown to be extremely resilient to infections and environmental contamination. The therapeutic usage of the leaves dates back only recently.



Figure 9 Ginkgo biloba and marketd formulation

5.1.1. Traditional and medicinal uses

Ginkgo has long been used in traditional Chinese and Japanese medicine. The Ginkgo tree has also shown to be extremely resilient to infections and environmental contamination.

While the “seed” or ovule is utilized in many Oriental countries for both cooking and medicine, the leaves are employed medicinally in western phytotherapy.

In medicine, it is used to treat a variety of conditions including bronchial asthma, cerebral insufficiency, cognitive impairment and memory loss, Alzheimer’s disease or senile dementia, anxiety and depression, ADHD disorder, diabetes and related circulatory disorders, glaucoma, and macular degeneration, as well as depression brought on by Raynaud’s syndrome.

5.2. (Scrophulariaceae) *Bacopa Monniera*

Bacopa monniera belongs to the Scrophulariaceae family and is one of its members. It goes by several names according on the language, such as Brahmi-sak in Hindi, Nir-Brahmi, Brahmi in Sanskrit, and Jalanimba in Bangla³⁶. The *Bacopa monniera* (BM) has a stem that is 10–30 cm long, 1-2 mm thick, and soft. It grows in marshes and on muddy coastlines. Sessile leaves are 0.6-2.5 cm length and 3-8 mm wide. Triterpenoid saponins, sometimes referred to as bacosides, are beneficial for memory. *B. monnieri*, also known as *Herpestis monnieri* in Latin and locally as water hyssop and Brahmi, has been utilized for thousands of years in the Ayurvedic medical system to treat mental health issues in patients. Scrophulariaceae is the family that includes *B. monnieri*. It naturally grows in moist soil, shallow water, and marshes in India and the tropics. The genus

Bacopa contains more than 100 species of aquatic plants, and this herb can be found locally at elevated levels from the sea about at altitudes of 4000-5000 feet. It can be easily farmed when there is an adequate water supply available.



Figure 10 *Bacopa monnieri* and marketed formulation

5.2.1. Traditional and medicinal uses

B. monnieri was traditionally used as a brain tonic to improve cognitive function, memory development, learning, focus, and concentration, as well as to help patients with anxiety or epileptic disorders. This is because it contains active compounds that have therapeutic properties like antispasmodic activity, anticholinesterase activity, contribute to neuroprotectivity, antioxidant activity, antidepressant properties, anti-ulcer activity, broncho-vasodilatory activity, and anti-inflammatory properties. The plant *bacopa monnieri*, often known as brahmi, is frequently utilized in Ayurvedic treatment. Bacopa is primarily used in Ayurvedic medicine for memory enhancement, sleeplessness, epilepsy, and anxiolytic effects. The plant *bacopa monnieri*, often known as brahmi, is frequently utilized in Ayurvedic treatment. Bacopa is primarily used in Ayurvedic medicine for memory enhancement, sleeplessness, epilepsy, and anxiolytic effects.

5.3. *Centella Asiatica*

The Umbelliferae plant *Centella Asiatica*.

Centella Asiatica (L) Urban (Umbelliferae/Apiaceae family) also goes by the name Mandukparni. In India, it is used as a spice or grown as a vegetable and utilized in herbal tonics to enhance immunity, improve memory, act as an anti-stress agent, and treat epilepsy and anxiety. *Centella Asiatica* protects against lead acetate-induced neurotoxicity, amnesia,

and memory loss by acting as an antioxidant. Early postnatal phases of development are when *C. asiatica* can create long-lasting positive effects on the cholinergic system and neuronal morphology in the mouse brain. It can also enhance natural antioxidant enzymes in the rat brain. Recent years have seen a global increase in interest in plant studies. A significant medicinal herb, *Centella Asiatica* is used extensively in the East and is gaining popularity in the West. *Centella Asiatica*'s main chemical components, triterpenoid saponins, are thought to be primarily in charge of its extensive medicinal effects. The herb is also advised for the treatment of many skin ailments, including leprosy, lupus, varicose ulcers, eczema, psoriasis, amenorrhea, and diseases of the female genitourinary tract, as well as for reducing anxiety and enhancing cognition. The current review aims to offer thorough details on the herb's pharmacology, modes of action, numerous preclinical and clinical investigations, safety precautions, and future research potential.



Figure 11 *Centella Asiatica* and marketed formulation

5.3.1. Traditional and medicinal uses:

Centella Asiatica, also referred to as gotu kola, has been used for thousands of years to treat a variety of illnesses in India, China, and Indonesia. It was used to heal wounds, improve mental clarity, and treat skin conditions including leprosy and psoriasis. The most important qualities are those that are anti-oxidant, anti-inflammatory, antibacterial, and anticarcinogenic. In dermatology, *Centella Asiatica* is used to treat small, hypertrophic wounds, burns, psoriasis, and scleroderma. *Centella Asiatica* improves memory and executive function in mice overexpressing β -amyloid through reducing mitochondrial dysfunction in the hippocampal area. Take the plant *Centella Asiatica* to enhance memory.

5.4. *Asparagus racemosus*



Figure 12 *Asparagus racemosus* and marketed formulation

Asparagus racemosus is a species of asparagus that is indigenous to northern Australia, the Indian subcontinent, and southern Asia. Satavar, Shatavari, Shatamull, and Shatawari are some of its common names. It can grow to a height of 1-

2 m (3 ft 3 in to 6 ft 7 in) and prefers the stony, gravelly soils of the piedmont plains at an elevation of 1,300-1,400 m (4,300-4,600 ft). It was given a botanical description in 1799. Due to its many uses, *asparagus racemosus* is highly sought for. Due to destructive harvesting, habitat loss, and deforestation, the plant is currently regarded as “endangered” in its natural habitat. The Liliaceae plant *A. racemosus*, also known as Satawar, Satamuli, or Satavari, is found throughout India at low elevations.

5.4.1. Traditional and medicinal uses

Indian traditional medicine uses shatavari. Despite shatavari’s extensive history of use in Ayurveda, no credible clinical data exist to back up its use as a treatment for any illness.

Research on its impact on lactation has shown conflicting findings. Its safety has not been thoroughly investigated, however two limited studies found no negative effects on mothers or their offspring. Alkaloids, mucilage, and steroidal saponins are among the components of shatavari.

Shatavari herb is used in traditional Indian medicine. even though shatavari has a long history to be utilized in Ayurveda, there is no reliable clinical evidence to support its use as a therapy for any disease.

There have been mixed results from studies on how it affects lactation. Two small studies that looked at its safety revealed no harm to mothers or their offspring. However, its safety has not been properly examined. Shatavari includes alkaloids, mucilage, and steroidal saponins among its ingredients.

5.5. *Acorus calamus*

Acorus calamus, which is also known as vacha in Hindi, is grown in the Himalayas at elevations of up to 6000 feet and is utilized as a brain tonic in both Indian and Chinese herbal traditions. Herbal experts use stem, roots, and leaves for effective supplements. Acoraceae family member Sweet flag (*Acorus calamus*) is referred to as a medication in traditional medicine. Spices and medications both employ the sweet flag’s fragrant leaves and rhizomes to add flavor. It is primarily vegetatively propagated and in demand due to the plant’s many applications. *Acorus calamus* has germplasm preservation for advantages in the pharmaceutical sector thanks to the in vitro approach.

The use of vacha in the treatment of neurological disorders. The mid-term, perennial, fragrant herb *Acorus calamus* Linn. (Acoraceae), also called Vacha in Sanskrit, is used in both the Chinese and the Ayurvedic (Indian traditional) systems of medicine. Rhizomes of the plant are twisted, cylindrical, curled, and short-nodded. They are brown in color. The leaves have a sword-like shape that is bright green and has curved borders in the middle. Numerous reports found that its plethora of active phytoconstituents were involved in a broad variety of biological activities.

This review’s goal is to compile and consolidate information on *A. calamus*’s geographic distribution, ethnopharmacology, phytochemistry, mechanism of action, and preclinical and clinical claims that are pertinent to the treatment of neurological and metabolic illnesses.

The Himalayan mountains evergreen *Acorus calamus*, also known as vacha in Hindi, is grows at heights of up to 6000 feet and is used in both Indian and Chinese herbal medicine as a brain tonic. For potent supplements, herbalists employ stem, roots, and leaves. Member of the Acoraceae family. The field of traditional medicine refers to the sweet flag (*Acorus calamus*) as a treatment. The sweet flag’s fragrant leaves and rhizomes are used in both spices and medicines to add flavor.

Due to the plant’s multiple uses, it is mostly vegetatively propagated and in high demand. Thanks to the in vitro method, *Acorus calamus* has advantages in the pharmaceutical industry for germplasm preservation.

The application of vacha in the management of neurological conditions. Mid-term perennial herb *Acorus calamus* Linn. (Acoraceae), which has a pleasant scent



Figure 13 *Acorus calamus* and marketed formulation

5.5.1. Traditional and medicinal uses

At least 2000 years have past since *A. calamus* Linn has been in use throughout Asia. The ancient Chinese employed it to cure edema and treat constipation. The components used include leaves, stem, and roots (rhizomes). In Indian Ayurvedic medicine, the rhizomes have been used as a sedative and to cure an assortment of ailments, such as fever, allergies and asthma, and bronchitis.

The Sioux made use of the entire plant, using the leaves to create aromatic garlands and the root to produce a beverage to heal digestive problems or rub the chewed root on the skin to treat ailments in general.

5.6. *Magnolia Officinalis* (magnoliceae)

The family of trees known as *Magnolia Officinalis*.



Figure 14 *Magnolia Officinalis* and marketed formulation

Natural magnolias, such as *Magnolia Officinalis*, are cultivated in China's mountains and valleys. It has a 20-meter height and a thick, dark bark. Houpu magnolia is another name for *Magnolia Officinalis*. Among the bioactive substances included in *Magnolia Officinalis* that are used in traditional Chinese medicine to treat neurosis, enhance memory, lessen anxiety, and prevent stroke are magnoliol, honokiol, and obovatol. In both human polymorphonuclear leukocytes and rat spleen microsomes, magnoliol and honokiol demonstrated an AChE inhibitory effect. *Magnolia Officinalis*, which grows between 300 and 1500 meters above sea level and is frequently referred to as the "houpu magnolia" or "magnolia-bark," is a species of Magnolia that is native to China's highlands .

5.6.1. Traditional and medicinal uses

The very fragrant bark, known in traditional Chinese medicine as hou po (thus the common name), is removed off the stems, branches, and roots. The traditional indications for use are to ease distension and get rid of moisture and phlegm. The majority of the bark utilized today for residential and commercial purposes comes from cultivated species.

The extremely aromatic bark is stripped from the stems, branches, and roots and used in traditional Chinese medicine, where it is known as hou po (thus the common name). The traditional uses include relieving distension and eliminating moisture and phlegm. Today, cultivated species provide the majority of the bark used for household and commercial reasons.

5.7. Aerobic activity

According to some scientists, giving your brain simple mental tasks may help you remember things better. Try to perform crossword or Sudoku puzzles in the morning, read the newspaper each day, or sign up for a class on a hobby or topic you don't know much about. These organic memory enhancers, either alone or in combination, may prevent the deterioration of memory and even partially recover some of it. Exercises like walking, running, dancing, skipping, and other aerobic activities that increase respiration and heart rate have been shown to increase the amount of blood and oxygen reaching the brain and Improve cognitive function.

6. Evaluation of natural medicines

Formulations which includes isolated phytoconstituent extracts, parts of the drug, or all of it are tested employing normal quality control processes. For quality control, methods such as UV-spectrophotometry, gas chromatography, high performance thin layer chromatography, and others are used

7. Conclusion

There are specific herbs that help with memory enhancement. Although some people may be skeptical about its efficacy, using herbs to improve memory has been practiced for centuries. The cognitive capabilities of the brain are enhanced by many kinds of spices and even hot foods. These medicinal plants are successful in treating conditions linked to memory loss. It is also suggested that a healthy lifestyle be supported by a nutritious diet, regular exercise, and mindfulness practices in addition to the use of nootropic plant extracts when needed to alleviate cognitive disorders.

There are particular medicinal plants that might enhance memory. Notwithstanding some people's reservations about its effectiveness, taking herbs to enhance memory has been a traditional practice for hundreds of years. Many types of spices, including hot foods, improve the brain's cognitive capacities.

Compliance with ethical standards

Acknowledgments

The authors are very thankful to the president Dr . Ramkrishna shinde Shraddha institute of pharmacy, Washim (India) for providing necessary facilities through principle Dr. Swati Deshmukh to complete this work ,and special thanks to the author Vinayak A.katekar for his creative suggestions, helpful discussion, unfailing advice, constant encouragement during this work.

Disclosure of conflict of interest

There is no conflict of interest, corresponding to the author(s).

References

- [1] Acharya D, Shrivastava, Anshu. Indigenous Herbal Medicines: Tribal Formulations and Traditional Herbal Practices. Aavishkar Publishers Distributor. . 2008, 440.
- [2] Adolph WH, MacDonald HA. Content and digestibility of morning and evening cuttings of alfalfa. J Anim Sci. 1947, 6, 348-51.

- [3] Agrawal A, Pandey MN, Dubey GP. Management of mental deficiency by an indigenous drug, Brahmi (*Bacopa monnieri*). *Pharmacopsychocologia*. 1993,6, 1-5
- [4] Ahlemeyer B, Krieglstein J. Neuroprotective Effects of Ginkgo biloba Extract. In: Lawson L, Bauer R., editors. *Phytomedicines of Europe*. Washington, DC: American Chemical Society 1998.
- [5] Akhlaq A, Tahira F, Madan A, Jolin Hwee-Jing Ong, Wei-Yi Ong. Ayurvedic Medicine for the Treatment of Dementia: Mechanistic Aspects. *Hindawi Evidence-Based Complementary and Alternative Medicine Volume*. 1-11.
- [6] Allain H, Raoul P, Lieury A, LeCoz F, Gandon JM, Arbigny P. Effect of two doses of Ginkgo biloba extract (EGb 761) on the dual-coding test in elderly subjects. *Clin Ther*.
- [7] Amieva H, Meillon C, Helmer C, Barberger-Gateau P, Dartigues JF. Ginkgo biloba extract and long-term cognitive decline. A 20-year follow-up population based study. *PLoS One* 2013, 8, 52755.
- [8] Aruna D, Naidu MU. Pharmacodynamic interaction studies of Ginkgo biloba with cilostazol and clopidogrel in healthy human subjects. *Br J Clin Pharmacol*.
- [9] Ashton AK, Ahrens K, Gupta S, Masand PS. Antidepressant-induced sexual dysfunction and Ginkgo biloba. *Am J Psychiatry*. 2000,157, 836-7.
- [10] Bastianetto S, Zheng WH, Quirion R. The Ginkgo biloba extract (EGb 761) protects and rescues hippocampal cells against nitric oxide-induced toxicity: involvement of its flavonoid constituents and protein kinase C. *J Neurochem*.
- [11] Bhowmik D, Chiranjib, Tiwari P, Tripathi KK, Sampath KP. Traditional Indian memory enhancer herbs and their medicinal importance. *Annals of Biological Research*.
- [12] Birks J, Grimley JE, Van MD. Ginkgo biloba for Cognitive Impairment and Dementia (Cochrane Review). In: the *Cochrane Database Syst Rev*. 2007, 2, CD003120.
- [13] Bone K, *Monographs for the Western Herbal Practitioner*. In: *Clinical Applications of Ayurvedic and Chinese Herbs*. Australia: Phytotherapy Press
- [14] Cada D, Covington TR, *The Review of Natural Products*. St. Louis: Facts and Comparisons.
- [15] Chopra RN. *Indigenous Drugs of India*. 2nd ed. Calcutta, India: U.N. Dhur and Sons.
- [16] Choudhary MI, Nawaz SA, Haq Z, Lodhi MA, Ghayur MN, Jalil S, Riaz N, Yousuf S, Malik A, Gilani AH, Rahman A. Withanolides, a new class of natural cholinesterase inhibitors with calcium antagonistic properties. *Biochem Biophys Res Commun*. 2005, 334(1), 276-87.
- [17] Choudhary MI, Yousuf S, Nawaz SA, Ahmed S and Rahman A. Cholinesterase inhibiting withanolides from *Withania somnifera*. *Chem Pharm Bull (Tokyo)*.
- [18] Chowdhuri DK, Parmar D, Kakkar P, Shukla R, Seth PK, Srimal RC, *Phytother Res*. 2002, 16, 639
- [19] Dentali S. *Natural Treatments to Improve Memory*, Prima Publishing, Roseville,
- [20] Dubey GP, Pathak SR, Gupta BS. Combined effect of Brahmi (*Bacopa monnieri*) and shankhpushpi (*Convolvulus pluricaulis*) on cognitive functions. *Pharmacopsychocologia*. 1994,7, 249
- [21] Dutta SK, Sharma BN, Sharma PV. Dulcitol from the flowers of Malkanguni (*Celastrus paniculatus* Willd.). *Bull Med Ethnobot Res*.
- [22] Engler A. *Syllabus der Pflanzenfamilien*. Berlin, Germany: Borntraeger; 1964, 2000, 199200.
- [23] Fruchier A, Rascol JP, Andary C, Privat G. A tropone derivative from *Orobancha rapumgenistae*. *Phytochemistry*.
- [24] Ghosal S, Lal J, Srivastava RS, Bhattacharya SK, Upadhyay SN, Jaiswal AK and Chattopadhyay U. Immunomodulatory and CNS effects of sitoindosides IX and X, two new glycowithanolides from *Withania somnifera*. *Phytotherapy Res*. 1989, 3, 201-6.
- [25] Goel B, Maurya NK. Memory booster herb (natural cognitive enhancers): An overview *International Journal of Physiology*.