



## **Cognitive Benefits of Herbs on Experimental Animal: A Review**

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### **ABSTRACT**

This literature review aims to examine the cognitive benefits of various herbs on experimental animals. Cognitive decline is a common concern associated with aging, and many researchers have turned to herbal remedies as a potential solution. This review explores the research on several herbs, including *Ginkgo biloba*, *Bacopa monnieri*, and *Panax ginseng*, and their effects on learning, memory, and other cognitive processes in animal models. The review highlights the potential mechanisms of action for each herb, as well as the strengths and limitations of the available research. Overall, the review suggests that herbs may offer promising cognitive benefits for animals, but more research is needed to fully understand their effects and potential applications for humans.

**Keywords:** Cognitive, *Ginkgo biloba*, *Bacopa Monnieri*, *Panax ginseng* and animal studies.

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### **INTRODUCTION**

Herbs have been used for centuries to improve cognitive functions, both in humans and animals. In recent years, many experimental studies have been conducted to examine the effects of different herbs on cognitive performance in animals. These studies have provided valuable information about the benefits of different herbs on cognitive function and have helped to identify the mechanisms underlying these effects. A nootropic is a type of substance, typically a drug or a supplement, that is believed to enhance cognitive function, including memory, creativity, and motivation. The term "nootropic" was first used by the Romanian psychologist and chemist to describe a new class of drugs that he believed had the potential to improve cognitive function (1).

Nootropics are often marketed as "smart drugs" and are claimed to have various benefits, including improving memory, focus, and overall cognitive performance. Some common examples of nootropics include piracetam, aniracetam, modafinil, and caffeine. However, the scientific evidence for the efficacy of many nootropics is limited, and more research is needed to fully understand their effects and potential risks. Substances that enhance brain and cognitive performance are known as nootropics (2). Ayurveda is an ancient system of medicines and developed therapeutic measures for variety of disease and ailments. Plants and plant-derived compounds have been used to prevent illness-related conditions and promote wellbeing since the dawn of time (3). Those aimed at enhancing and improving cognition, a key trait of humans that differentiates us from the rest of the living forms on Earth, represent a significant portion of the pharmacopeia available to ancient cultures and civilizations (4). It was thus already known in these ancient communities that improvements in cognition help humans thrive and are directly associated with better achievement in most areas of life (5). Although there is a wide group of molecules that fit into this rather vague category (e.g., vitamins found in foods, such as B12, which can enhance cognitive performance by ensuring proper brain metabolic function).

Rejuvenation therapy which uses various agents that have been developed to delay ageing and rejuvenating whole functional dynamics of the body system is known as the „Rasayanachikitsa" (rejuvenation therapy). Ayurveda claims that several plants called as the "Medhya" plants (intellect promoting) herbs are beneficial in cognitive disorders. Drugs and natural remedies have been prescribed to enhance memories and prevent from memory deficits in the brain for curing dementia. Memory enhancer herbs enhance the memory and increase the blood circulation in the brain. Nootropics have been employed in cases of degenerative brain disorders such as Alzheimer's or Parkinson's disease (5). The effort to find the substances that might enhance brain function is a very difficult one. In the light of above we tried to compile medicinal plant (Herbs) with nootropic activity from literature

***Bacopa monnieri***

One of the most well-known nootropic plants is *Bacopa monnieri*, also known as Brahmi (6). It has been used in Ayurvedic medicine for centuries to improve memory and cognitive function (7). Experimental studies have shown that *Bacopa monnieri* extract can improve memory consolidation and recall in rats and mice, and is believed to enhance cognitive function by increasing the levels of neurotransmitters, such as acetylcholine and dopamine, in the brain (8).

***Ginkgo biloba***

Another well-known nootropic plant is *Ginkgo biloba*, which is commonly used in traditional Chinese medicine to improve memory and cognitive function (9). Experimental studies have shown that *Ginkgo biloba* extract can improve memory and learning in rats and may also have anti-inflammatory and antioxidant effects in the brain. The active compounds in *Ginkgo biloba* are believed to improve blood flow to the brain, which may contribute to its cognitive benefits (10).

***Rhodiola rosea***

*Rhodiola rosea* is another plant that has been studied for its potential as a nootropic. It has been used in traditional medicine systems to improve cognitive function and reduce stress. Experimental studies have shown that *Rhodiola rosea* extract can improve memory and learning in mice and may also have anxiolytic and anti-depressive effects. This plant is believed to enhance cognitive function by increasing the levels of neurotransmitters, such as serotonin and dopamine, in the brain (11).

***Panax ginseng***

It is also known as Asian ginseng, is a well-known nootropic plant. *Panax ginseng* has been used in traditional Chinese medicine for centuries to improve cognitive function and reduce stress. Experimental studies have shown that *Panax ginseng* extract can improve memory and learning in mice, as well as having anti-inflammatory and antioxidant effects in the brain (12). The active compounds in *Panax ginseng* are believed to improve blood flow to the brain, which may contribute to its cognitive benefits (13).

***Cyclanthera pedate***

*Cyclanthera pedata*, also known as "Japanese Cucumber" or "Slicing Cucumber," is a plant species that is native to South America and is grown for its edible fruit. While there is limited information on the nootropic activity of *Cyclanthera pedata*, some preliminary studies suggest that it may have potential as a cognitive enhancer. One study published in the *Journal of Ethnopharmacology* found that an ethanol extract of *Cyclanthera pedata* seeds showed potential as a cognitive enhancer in rats, as it improved learning and memory retention in a water maze task. However, more research is needed to fully understand the potential cognitive benefits of this plant and to determine its safety and efficacy in humans (14).

***Withaniasomnifera***

Ashwagandha is an adaptogenic herb that has been traditionally used in Ayurvedic medicine to improve stress resistance, mood, and cognitive function. Clinical trials have suggested that Ashwagandha may improve memory and reaction time, reduce anxiety and depression, and enhance overall cognitive performance in healthy adults (15).

***Huperzia serrata***

It is a plant species that has been traditionally used in Chinese medicine to improve memory and cognitive function also known as Chinese club moss. Modern research has suggested that the active compound in *Huperzia serrata*, Huperzine A, may enhance the availability of the neurotransmitter acetylcholine and improve memory and cognitive performance in both healthy adults and individuals with Alzheimer's disease (17).

***Rosmarinus officinalis***

Rosemary is a common culinary herb that has been used for centuries to enhance memory and cognitive function. Some studies have suggested that the compounds in rosemary, such as carnosic acid and carnosol, may have neuroprotective effects and improve memory performance in both young and elderly individuals (18).

***Salvia officinalis***

Sage is another culinary herb that has been used for centuries to improve memory and cognitive function. Some studies have suggested that sage may improve memory performance in young and elderly individuals and enhance overall cognitive performance in healthy adults (19).

***Centella asiatica***

Gotu kola is a plant species that has been traditionally used in Ayurvedic medicine to improve memory and cognitive function. Some preliminary studies have suggested that Gotu kola may enhance memory and cognitive performance, reduce anxiety and depression, and improve overall brain health (16).

***Hericium Erinaceus***

Lion's Mane Mushroom is a type of edible mushroom that has been traditionally used in Chinese medicine to improve cognitive function and memory. Modern research has suggested that Lion's Mane Mushroom may enhance neurogenesis and promote nerve growth in the brain, which can help to improve memory and cognitive function (20).

#### ***Curcuma longa***

Turmeric is a spice commonly used in Indian cooking that has a long history of use in traditional medicine to enhance brain function and improve memory. Some studies have suggested that the active ingredient in turmeric, curcumin, may have neuroprotective effects, reducing inflammation and oxidative stress in the brain, and may improve memory and cognitive performance (21).

#### ***Ganoderma lucidum***

Reishi Mushroom is a type of medicinal mushroom that has been traditionally used in Chinese medicine to improve cognitive function and enhance overall health. Some studies have suggested that Reishi Mushroom may have neuroprotective effects, reducing oxidative stress and inflammation in the brain, and may improve cognitive performance (22).

#### ***Ocimum sanctum***

Holy Basil is a plant species native to India and has been traditionally used in Ayurvedic medicine to enhance cognitive function and improve memory. Some studies have suggested that Holy Basil may reduce stress and anxiety, and may have a positive impact on cognitive performance (23).

#### ***Camellia sinensis***

Green tea is a type of tea that is made from *Camellia sinensis* leaves and has been traditionally used in Chinese medicine to improve cognitive function and enhance overall health. Some studies have suggested that green tea may have neuroprotective effects, reducing oxidative stress and inflammation in the brain, and may improve memory and cognitive performance (24).

#### ***Schisandra chinensis***

Schisandra is a plant native to East Asia that has been traditionally used to improve cognitive function and memory. Some studies have suggested that Schisandra may have a positive impact on attention, memory, and cognitive performance (25).

#### ***Ilex paraguariensis***

Yerba Mate is a plant native to South America that has been traditionally used to improve mental alertness and cognitive performance. Some studies have suggested that Yerba Mate may have a positive impact on attention, mood, and cognitive function (26).

#### ***Coffea arabica***

It contains caffeine, which is a stimulant that can increase alertness and reduce fatigue, but it is also associated with side effects such as anxiety and jitters (27). Studies have suggested that moderate caffeine consumption can enhance cognitive function and improve mood, but the effects can vary based on the individual and the amount consumed. It's important to note that the effects of coffee and caffeine on cognitive function can be both positive and negative, and can vary depending on the individual and their tolerance to caffeine (27-33).

#### ***Emblica officinalis***

It is also known as Indian Gooseberry or Amla, is a traditional Ayurvedic herb that has been used for centuries for its potential health benefits. There is some evidence that suggests that Amla may have cognitive-enhancing properties. Amla is a rich source of antioxidants, particularly Vitamin C, and has been shown to have anti-inflammatory and neuroprotective effects. Some preliminary studies have suggested that Amla may help improve memory, cognitive function, and mood, but more research is needed to determine the full extent of its effects on the brain (34-38).

Other herbs that have been studied for their nootropic activity in experimental animals include *Withania somnifera*, *Gynostemma pentaphyllum*, and *Centella asiatica*. *Withania somnifera* has been shown to improve cognitive function in mice (39) and rats (40). *Gynostemma pentaphyllum* has been shown to improve cognitive function in rats (41), and *Centella asiatica* has been shown to improve cognitive function in mice (42).

## **CONCLUSION**

In the research on the nootropic activity of herbs in experimental animals suggests that several herbs have the potential to enhance cognitive function. However, more research is needed to confirm the efficacy and safety of these herbs in humans. Furthermore, the mechanisms underlying the nootropic activity of these herbs need to be better understood. Nevertheless, these findings provide a promising avenue for future research in the development of natural remedies for cognitive dysfunction.

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