

Memory boosters: A Review on Indian Ayurvedic Herbs

Tulika Dey¹, Surendra Pratap Mishra²

Ph.D Scholar, Department of Biochemistry, Institute of Medical Sciences, Banaras Hindu University,
Varanasi, India¹

Associate Professor, Department of Biochemistry, Institute of Medical Sciences, Banaras Hindu University,
Varanasi, India²

ABSTRACT: Memory is still one of the mysterious facts in the world of biological sciences. In spite of a lot of researches, scientists are still not able to unfold its many aspects. This is one of a special gift by nature to the human beings which make them superior to other living organisms in the world. Since, thousands years, many traditional practices has been used to boost memory power especially in children. Now-a-days, millions of people in different parts of the world are suffering from dementia and neurodegenerative diseases which result in loss of memory. To solve this problem, the modern medicine has introduced many drugs but they all have some or other side effects on physiological processes. The Indian Ayurveda is a golden treasure of natural medicines and a boon for many complex disorders which can't be treated by even costly modern medicines. The Ayurveda mentions Medhya Rasayanas or memory boosters which are actually plant products having memory boosting properties. The main purpose of writing this article is to introduce these herbs in daily life practices over modern medicines and lead a healthy life.

KEYWORDS: Dementia, Neurodegenerative, Ayurveda, Modern medicines, Medhya Rasayanas

I. INTRODUCTION

Learning is a process by which information is captured as a result of experience and this captured information is reproducible. Memory is a storage process so that one can retrieve the information which is captured by learning process. So, learning is first step towards memory. Memory is called poor when information retrieval is slow or not possible. Poor recalling or poor memory is one of very common problems in today's busy life style. This may be due to stress, depression, anxiety, poor diet, lack of exercises etc. Besides this, age, emotional reasons, fear, stress and environmental factors may lead to dementia and neurodegenerative diseases responsible for age-related memory loss. Development of memory consists of three steps- Acquisition, Retention and Retrieval. It can be described as follows:

1. **Acquisition-** This is the first basic step which is based on learning and experience. It is encoding and registration of learned information.
2. **Retention-** This is the second step which is the storage of learned information in the brain which results in formation of short term memory.
3. **Retrieval-** This is the last step which can be either recognition or recalling the learned information. Recognition is a simple process which requires less neurons for retention whereas recall is the actual retrieval of information. It's a complicated process involving a neuronal network.

Ayurveda contains a long list of memory boosting herbs that are used for improvement of learning and recalling power. These herbs are also known as Nootropic herbs (Cognitive drugs or smart drugs) which basically improve blood circulation and oxygenation in the brain. The extracts from these herbs contains many powerful chemicals that enhance memory power. These chemical extracts are called Medhya Rasayanas in Ayurveda where medhya means retention power and rasayana means therapeutic plant extracts [1-3].

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The following is a list of most commonly used and powerful nootropic herbs with their properties in relation to memory enhancement and advantages. The effect of these herbs depends on age of the person and other factors such as diet, exercises etc [4, 5]. The list goes as follows:

1.1. *Withania somnifera*

Popularly known as Ashwagandha, the plant is one of the most widely used Ayurvedic medicine for over thousands of years and has been a hot research topic among scientists all over the world. Since this herb is quite popular in Indian Ayurveda like Ginseng in Chinese medicinal system, it is also known as “Indian Ginseng”. In Sanskrit, Ashwa means ‘horse’ and Gandha means ‘odour’ just because the smell of the plant’s root is like that of horse’s sweat. The plant belongs to solanaceae family. The rasayanas extracted from fresh roots are excellent in therapeutic uses [2, 3].

In Ayurveda, the plant extracts is used as a tonic for energy enhancement, stamina, good health, blood purification, impotency, chronic stress, cardiovascular diseases, anti-aging, anxiety, depression etc. Many scientific studies show that *Withania* promotes neuronal growth in human neuroblastoma cells and rat brain. This is responsible for boosting memory [6, 7].

This is the reason that researches are carrying for its use as potential therapeutic drug in case of dementia caused due to neurodegenerative diseases like Alzheimer’s and Parkinson’s disease. Studies show that the roots of the plant contains withanolides responsible for its medicinal properties [8].

1.2. *Baccopa monnieri*

Commonly called Brahmi, *Baccopa monnieri* is one of the best herbal memory booster since 3000 years back or more in India. Its vast medicational properties are mentioned in “Atharva-Veda” and also in Ayurveda. It has been traditionally used as a memory boosting tonic for children. It belongs to the family scrophulariaceae [9, 10].

The major medicinal properties of brahmi include antidepressant, anxiolytic effect, anticonvulsant and antioxidant [11]. Besides this, the antiparkinsonian effect of brahmi has been proved on a transgenic model of *Caenorhabditis elegans*, a nematode proving it as a potential neuroprotective and therapeutic drug. It has been used as memory booster due to its properties like improved acquisition, retention and recalling [12]. The major phytochemical constituent responsible for memory enhancement properties are bacosides, specially *Bacosides A*. This is basically a saponin. Some recent studies show that the plant also contains antispasmodic, anticholinesterase, antiulcerogenic, anticancer, antileishmanial properties etc [13, 14].

1.3. *Convolvulus pluricaulis*

Shankhapushpi, a perennial herb belongs to the family Convolvulaceae and is commonly found in India. Each and every part of the plant has medicinal properties. This herb has amazing properties of enhancing acquisition, retention and retrieval, all the three aspects of memory [15].

The phytoconstituents of the herb are glucose, sucrose, starch, coumarins, sitosterol, convolvine, convolidine and several hydrocarbons. It has properties to reduce gastric ulcers, reduces stress, controls neurotoxicity levels, reduce pain, blood cholesterol level etc [16]. Its primary use, as mentioned in Ayurveda, is a potent brain tonic. It is a best formulation for improving memory in kids and young children. It also prevents loss of memory if consumed on a regular basis [17]. It is also used in the treatment of high and low blood pressure, hypothyroidism, anxiety, stress and other neuro-psychiatric conditions. Overall, it acts as rejuvenation therapy [18].

1.4. *Centella asiatica*

Mandookaparni or Gotu Kola belongs to the family Apiaceae is a perennial creeping herb. It has been used in traditional ayurvedic medicinal system as memory boosting tonic. The plant is quite beneficial for improving short term memory and learning. Some researches show that the plant extract shows neuroprotective effect against oxidative damage caused due to lead acetate [19, 20].

The herb is found to be quite effective in case of Parkinson’s Disease (PD). The aqueous extract of the herb inhibit the formation of α -Synuclein aggregates and helps in disintegration of preformed fibrils. It also shows neuroprotective effects against chronic aluminium exposure induced mitochondrial enzyme alterations, oxidative stress, apoptosis and cognitive dysfunctions [2]. Asiatic Acid, a chief chemical constituent of the herb, that possess neuroprotective and

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therapeutic effects [3]. Researches are going on for improving their efficiency as a potent drug for the treatment of Alzheimer's Disease, Parkinson's Disease and other neurodegenerative disorders [21].

1.5. *Tinospora cardifolia*

Popularly known as Guduchi or Giloy, the plant belongs to Menispermaceae is an important drug of Indian medicinal system [1]. It is mainly distributed in India and China [2]. Since ages, it has been used for rejuvenating health and strengthening immune system. It also possess anti-cancerous, immunomodulation and memory enhancing properties [22, 23].

The main phytoconstituents of Guduchi are alkaloids, diterpenoids, glycosides, steroids, sesquiterpenes, phenolics and aliphatic compounds etc. The leaves of the plant contains protein, calcium, phosphorus etc [24]. The glucosides also called amritosides A, B, C and D have been extensively studied. The aerial parts of the plant extract have been shown to possess neuroprotective properties which was tested in Parkinson's Disease rat models. Guduchi is also a very potent antidepressant [25, 26].

1.6. *Glycyrrhiza glabra*

Licorice, commonly known as Yashtimadhu or Mulethi, a member of Fabaceae, is worldwide popular for its various curative properties. It has been referred as Medhya Dravya in Charaka Samhita. It is a potent brain tonic and rejuvenates the neuronal cells [1].

Its main phytoconstituent Glycyrrhizin, a triterpene that is present in the fruits and rhizomes possess neuroprotective properties [27, 28]. The aqueous and ethanol extract of the plant has anticonvulsant properties [29]. Some researches show that glabridin, a flavonoid, has a neuroprotective effects as it reduces the rate of apoptosis [30, 31].

S. No.	Examples	Properties
1.	<i>Mucuna pruriens</i> (Kapikachu)	It can be used as an anti-Parkinsonian drug as it contains sufficient amount of L-Dopa [1]
2.	<i>Celastrus paniculata</i> (Jyotishmati)	Plays a significant role in memory improvement and memory disorders in age related neurodegenerative disorders; the seeds contain the main drug elements [1, 3]
3.	<i>Acorus calamus</i> (Vacha)	The rhizomes of the plant is given along with other plants such as Mandookaparni, Brahmi etc. in case of memory loss [1,2]
4.	<i>Zingiber officinalis</i> (Adrak, Ginger)	Significantly improves blood circulation in all parts of brain thus enhancing memory; contains antiemetic, anti-inflammatory, antiarthritis properties [2, 32]
5.	<i>Ginkgo biloba</i> (Ginseng, Yinshing)	Boosts supply of oxygen and nutrients in brain reduces oxidative stress by removing free radicals; treats cognitive impairment [2, 33]

Table 1: Some other Ayurvedic herbs and their medicinal properties

II. CONCLUSIONS

The main focus of this review article is on memory improving traditional Ayurvedic herbs that acts on dementia. Dementia is a neurological syndrome which mainly results in impairment in memory, thinking and judgement capabilities. It is quite unfortunate that inspite of living in a country, which has a huge diversity of rich Ayurvedic herbs that have been traditionally used over thousands of years by our forefathers, we have forgot them and moved towards modern medicines which are not only expensive but also have many side effects. Now, this is the time where we should do profound research to establish their molecular basis of medicinal properties and improve their drug efficiency and also establishing their connection with evidence based medicines that will incorporate molecular basis of herbal extracts.

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