



A Review on Phytoconstituents of Brahmi and their Relation to Improve Nervous System

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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Review Article

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ABSTRACT

Ayurveda is a well-known practice for treating number of diseases from ages. It is a natural system from old age for the balancing of various body systems through herbs. There are lot of herbs used in curing the diseases and one among them is Brahmi. It has the ability to boost up the memory. Morphologically, it is a small sized succulent herb that have number of branches. This herb is well known for strengthening memory, brain functions and cooling properties. In this review paper, brief detail about its phytoconstituents and medicinal uses are discussed.

Keywords: Ayurveda; antioxidants; anxiety; stress; medicinal.

1. INTRODUCTION

Brahmi (*Bacopa monnieri*) is a perennial herb [1] which is remembered because of its memory enhancing feature. It is derived from the name of Brahman and Goddess Sarasvati. Its tea is usually consumed by brewing, leaves help to fight from cold, chest congestion and bronchitis. This occurs by removing the mucus from the air

passages which helps in easy breathing [2]. Also found to reduce pain and, inflammation in throat and respiratory tracts due to its anti-inflammatory property. The powder of this plant along with milk helps to improve brain functions by preventing brain cell damage caused by free radicals that shows the impact of its antioxidant property [3]. It is also used as a brain tonic for children that helps in improving cognition. Its oil is very

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Table 1. Active constituents of Brahmi

Chemical constituents	Contents	Reference
Saponins	Monnierin , D- mannitol, Bacoside A , Bacoside B , Bacosaponins , Acid A	[1,6]
Flavonoids	Luteonin, Apigenin	[1,6]
Alkaloids	Isobrahmic acid, Brahaminoside, Brahamoside, Brahmlic acid	[1,6]
Glycosides	Thanakunicide, Asiaticoside	[1,6]
Phytochemicals	Stigmasterol, Beta-sitosterol, oroxindin, wogonin, Betulic acid, Betulinic acid	[1,6]
Sapogenin	Isobrahmic acid, Brahaminoside, Brahamoside, Brahmlic acid	[1,6]
Other Constituents	Isobrahmic acid, Brahaminoside, Brahamoside, Brahmlic acid	[1,6]

effective to prevent hair loss, nourishes and provides strength to them. Acts as disinfectant on the skin and speeds up the healing process when applied externally. Excessive intake of Brahmi should be avoided as it may cause nausea and dry mouth. It is widely used in the western countries and developing countries therapeutically and is becoming increasingly popular. The herb is described in many Ayurvedic books including Charaka Samhita and Sushruta Samhita [4]. It is a non-tropic herb that shows properties of an astringent, cardiogenic, diuretic, analgesic, antipyretic, anti-inflammatory and antiepileptic agent. In ancient Ayurvedic ages, the super physicians described Brahmi's role as Ayushya (longevity), Hridhay (Heart) Madhya (intellect), Balya (strength especially mind), and Rasayana (Rejuvenation) [4]. Many active constituents (Table 1) like saponins, flavonoids and saponin etc are found in this plant [5].

1.1 Taxonomic Classification

Kingdom – Plantae
Division – Anthophyta
Class – Dicotyledoneae
Order – Scrophulariales
Family – Scrophulariaceae
Genus – Bacopa
Species – monnieri

1.2 Distribution of *Bacopa monnieri*

Bacopa monnieri originated from tropical Asia, and now is widespread throughout the sub tropics and tropics. It is also found across the Asia, Africa, Arabian Peninsula, Australia, America, Caribbean and is invasive in Singapore, Portugal, Cayman Islands, Japan and Spain. In India, it is widely distributed in Uttar Pradesh, Panjab, Haryana, Bihar, Bengal, Karnataka, Kerala, Tamil Nadu, in the foot hills of Himachal Pradesh and Uttaranchal [4,7].

2. MEDICINAL USES OF BRAHMI

2.1 Boosts Memory Power

Brahmi (*Bacopa monnieri* Linn.) is a naturally occurring herb found in India. Since long time it is used in Ayurvedic medicine for treatment of numerous disorders but mainly includes weak memory problem and anxiety issues [8]. Many western countries adapted this plant which act as a memory boosting agent. Main constituents of

this herb are Bacosides A and Bacosides B, Steroidal saponins and active constituents like saponins and alkaloids [9].

2.2 Wound Healing

Brahmi leaves help in the process of wound healing due to the presence of triterpenoids present in the extract of Brahmi leaves. It helps to increase the overall amount of collagen in cell layer fibronectin thereby healing the wound [10]. The collagen in wound synthesis can be remodelled by a substance named peptidic hydroxy proline which is increased by Asiatic acid extracted from Brahmi leaves [11,12].

2.3 Anxiolytic Effect

This herb exhibits anxiolytic impact which was shown through couple of experiments. In which the higher dosage of *Bacopa monnieri* separate had prominent anxiolytic impact as compared to lorazepam. It also showed a memory advancing activity on human beings [4].

2.4 Effect of Brahmi on Cancerous Activity

Ayurvedic and herbal medications are more effective and safer than the pharmaceutical medicines [13]. Brahmi is a wonder herb and plays down its role in curing tumour [14] due to its constituents like Bacopsides that are being used to cure cancer disease. *Bacopa* is also used in phytoremediation of various metals like lead, mercury, chromium and cadmium [15].

2.5 Helps in Reducing Stress and Anxiety

The active ingredients composition of this herb impacts the balance of stress hormones in our body by inducing a calm and relaxed state [16]. It is done naturally by simply direct chewing of 2 – 3 leaves of this herb that contains bacopsides [17,18]. This process is very effective and significant as it reduces any dependency on other pharma products [8].

2.6 Hepatoprotective Activity

Bacopa monnieri has hepatoprotective property, that can be credited to presence of bacoside-A. Pre-treatment with ethanolic extract of this herb against carbon tetrachloride have defensive impact. It protects liver from liver-cirrhosis in an experiment on mice, rodents and framework models of human [7].

2.7 Endocrine Effects

In a couple of studies Brahmi treats irregularities related to endocrine. CDRI-08 exhibit to control release of thyroid in an experiment on male mice. The consumption of Brahmi enhanced the union of T4 chemical by 41% [4].

2.8 Anti Stroke Effect

Brahmi has intense therapeutic capacity in treating Parkinson's disease and Alzheimer's disease. In the trial experiments on mice, to treat ischemic cerebrum, herb showed defensive impact and reduced infarct size. It resulted in catalase movement and development of muscle coordination in rodents. Also, the cerebral blood stream expanded by 25% without affecting the circulatory strain. Thus, Brahmi is quite effective in treating neurological problems [4,7].

2.9 Anti Nociceptive Activity

Fluid concentrate of *Bacopa monnieri* shows pain relieving movement through numerous aggravation pathways [4] for example inclusion of α_2 – adrenergic, 5-HT and β_1 -adrenergic receptors. Moreover, the mixing of concentrate with naloxone didn't increase the inactivity to relieve pain. Narcotic receptors may have played a role behind pain relieving movement [4].

2.10 Cardiovascular Activity

Ethanollic concentrate of *Bacopa monnieri*, showed cardiovascular burdensome action on left ventricular contractility, pulse and coronary stream in heart of rabbit. It additionally showed that defensive impact of this herb on pneumonic conduit and aorta [4].

2.11 Anti-inflammatory Action

The leaves of Brahmi show anti-inflammatory activity. These are rubbed and applied on the body part that is affected by inflammation. Constituents like Bacopsides A and Bacopsides B [19], extracted from this herb are used in curing the swelling and inflammation. It is also beneficial for various pains like joint pain (arthritis) and gout also [8,20-23].

3. CONCLUSION

Brahmi is no doubt a medicinal wonder herb with numerous uses and benefits that are unmatched with any other plant available on earth. However,

the area of research from the therapeutic point of view still remains unexplored although some of the uses have been found which remain hidden, as Brahmi was more explored by the Ayurveda. Brahmi is a great source, that could have many other therapeutic uses to heal many diseases that is still unknown. It could increase the human memory power as well without any side effects. Thus, more experimental and clinical trials can be conducted to know other therapeutic aspects of this wonder plant.

CONSENT

It's not applicable.

ETHICAL APPROVAL

It's not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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