

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

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 lotsof herbs used in curingthe diseases and one herb 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 its 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(4) which is rememberedbecause 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 by removing the mucus from the air passages which helps in easy breathing (5). 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(6). It is also used as a brain tonic for children that helps in improving cognition. Its oil is very 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 which shows many properties like as an astringent, cardi tonic, 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)(7). Many active constituents like saponins, flavonoids and saponin etc are found in this plant (Table Number 1) (8).

Taxonomic Classification

Kingdom – Plantae

Division – Anthophyta

Class – Dicotyledoneae

Order – Scrophulariales

Family – Scrophulariaceae

Genus – *Bacopa*

Species – *monnieri*

TableNumber1:Active Constituents of Brahmi

| Chemical constituents | Contents | Reference |
|------------------------------|--|------------------|
| Saponins | Monnierin , D- mannitol, Bacoside A , Bacoside B , Bacosaponins , Acid A | (4,9) |
| Flavonoids | Luteonin, Apigenin | (4,9) |
| Alkaloids | Isobrahmic acid, Brahaminoside, Brahamoside , Brahmie acid | (4,9) |
| Glycosides | Thanakunicide , Asiaticoside | (4,9) |
| Phytochemicals | Stigmasterol, Beta – sitosterol , oroxindin , wogonin, Betulic acid , | (4,9) |

| | | |
|---------------------------|---|-------|
| | Betulinic acid | |
| Sapogenin | Isobrahmic acid, Brahminoside, Brahamoside , Brahmie acid | (4,9) |
| Other constituents | Isobrahmic acid, Brahminoside, Brahamoside , Brahmie acid | (4,9) |

2. Medicinal Uses of Brahmi

2.1 Boosts Memory Power

Brahmi (*Bacopa monnieri* Linn.) is a naturally occurring herb found in India. It is being used since so long in Ayurvedic medicine for treatment of numerous disorders but mainly including those who have weak memory problem and have anxiety issues(10). Many western countries adapted this plant which act as a memory boosting agent. Main constituents of herb are Bacosides A and Bacosides B, Steroidal saponins and many active constituents like saponins and alkaloids.(11).

2.2 Wound Healing Capacity

Brahmi leaves helps in the process of wound healing by a substance which is triterpenoid in nature, extracted from *Centella asiatica* that helps in increasing the overall amount of collagen in cell layer fibronectin thereby healing the wound(12). The collagen in wound synthesis can be remodelled by a substance named peptidic hydroxy proline which is increased by an acid that is Asiatic acid extracted from Brahmi leaves .(13,14).

2.3 Effect of Brahmi on Cancerous Activity

Ayurvedic and herbal medications are more effective and safe than the pharmaceutical medicines.(15). Ayurvedahas many health benefits and Brahmi played its role as a wonder herb and plays down its role in tumor also(16). Due to its constituents like Bacopsides it is used to cure cancer disease. *Bacopais* also used as in phytoremediation of various metals like lead, mercury, chromium and cadmium(17).

2.4 Helps in Reducing Stress and Anxiety

The active ingredients composition of this herb impact the balance of stress hormones in our body, thereby inducing a calm, relaxed state by inducing the hormonal balance in the body(18). It is done naturally by simply direct chewing of 2 – 3 leaves of this herb that contains bacopsides(19,20). This process is very effective and significant as it reduces any dependency on other pharma products(10).

2.4 Anti-inflammatory Action

The leaves of Brahmi are applied and rubbed on the part of the body which is affected by inflammation. Due to the presence of constituents like Bacopsides A and Bacopsides B(21), the saponins extracted from this herb are used in curing the swelling and inflammation by rubbing its leaves. It is also beneficial for various pains like joint pain (arthritis) and gout also(10, 22).

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, there could be many therapeutic uses which could heal many diseases that is still unknown. It could increase the human memory power as well without any side effects. Thus, more experimental trials can be conducted to known other therapeutic aspects of this wonder plant.

NOTE:

The study highlights the efficacy of " Ayurveda " which is an ancient tradition, used in some parts of India. This ancient concept should be carefully evaluated in the light of modern medical science and can be utilized partially if found suitable.

References

1. Thorat BS, Bagkar TA, Patil RR. "Brahmi" The memory booster medicinal herb. In: ~ 185 ~ Journal of Medicinal Plants Studies. 2018. p. 185–7.
2. Mukherjee A, Gombar V, Shamsi Y, Gupta M, Sinha S. Effectiveness of Brahmi in Various Illnesses: Review Paper. Herbal Medicine: Open Access. 2017;03(02).
3. Soumyanath A, Zhong Y-P, Yu X, Bourdette D, Koop DR, Gold SA, et al. Centella asiatica accelerates nerve regeneration upon oral administration and contains multiple active fractions increasing neurite elongation in-vitro . Journal of Pharmacy and Pharmacology. 2010;57(9).
4. Chaudhari KS, Tiwari NR, Tiwari RR, Sharma RS. Neurocognitive effect of nootropic drug Brahmi (*Bacopa monnieri*) in Alzheimer's disease. Vol. 24, Annals of Neurosciences. 2017.
5. Stough C, Singh H, Zangara A. Mechanisms, efficacy, and safety of bacopa monnieri (Brahmi) for cognitive and brain enhancement. Vol. 2015, Evidence-based Complementary and Alternative Medicine. 2015.
6. Pravina K, Ravindra KR, Goudar KS, Vinod DR, Joshua AJ, Wasim P, et al. Safety evaluation of BacoMind™ in healthy volunteers: A phase I study. Phytomedicine. 2007;14(5).
7. Deo YK, C RKR. Critical review on pharmacological properties of Brahmi. International Journal of Ayurvedic Medicine. 2013;4(2).
8. Rastogi S, Pal R, Kulshreshtha DK. Bacoside A3A triterpenoid saponin from *Bacopa monniera*. Phytochemistry. 1994;36(1).
9. Daniel M. Medicinal plants: Chemistry and properties. Medicinal Plants: Chemistry and Properties. 2016.

10. Singh HK, Dhawan BN. Neuropsychopharmacological effects of the ayurvedic nootropic *Bacopa monniera* Linn. (Brahmi). *Indian Journal of Pharmacology*. 1997;29(5).
11. Gnanapragasam A, Yogeeta S, Subhashini R, Ebenezar KK, Sathish V, Devaki T. Adriamycin induced myocardial failure in rats: Protective role of *Centella asiatica*. *Molecular and Cellular Biochemistry*. 2007;294(1–2).
12. Lal RK, Gupta P, Dubey BK. Genetic variability and associations in the accessions of *Mandukparni* {*Centella asiatica* (L)}. *Industrial Crops and Products*. 2017;96.
13. Madhura Mestry, Amrita Bajaj, Meenal Rane, KausaniLalan. Herbal CNS stimulants. *International Journal of Herbal Medicine*. 2016;4(6).
14. Saxena G, Flora SJS. Changes in brain biogenic amines and haem biosynthesis and their response to combined administration of succimers and *Centella asiatica* in lead poisoned rats . *Journal of Pharmacy and Pharmacology*. 2010;58(4).
15. Veerendra Kumar MH, Gupta YK. Effect of different extracts of *Centella asiatica* on cognition and markers of oxidative stress in rats. *Journal of Ethnopharmacology*. 2002;79(2).
16. Cheng CL, Koo MWL. Effects of *Centella asiatica* on ethanol induced gastric mucosal lesions in rats. *Life Sciences*. 2000;67(21).
17. Chopra, R.N., Nayar, S.L., Chopra IC. *Glossary of Indian Medicinal Plants*. CSIR,(New Delhi, India). 1956.
18. Viji V, Helen A. Inhibition of pro-inflammatory mediators: Role of *Bacopa monniera* (L.) Wettst. *Inflammopharmacology*. 2011;19(5).
19. Chakravarty AK, Garai S, Masuda K, Nakane T, Kawahara N. Bacopasides III-V: Three new triterpenoid glycosides from *Bacopa monniera*. *Chemical and Pharmaceutical Bulletin*. 2003;51(2).
20. Chakravarty AK, Sarkar T, Nakane T, Kawahara N, Masuda K. New phenylethanoid glycosides from *Bacopa monniera*. *Chemical and Pharmaceutical Bulletin*. 2002;50(12).

21. Deepak M, Sangli GK, Arun PC, Amit A. Quantitative determination of the major saponin mixture bacoside A in *Bacopa monnieri* by HPLC. *Phytochemical Analysis*. 2005;16(1).
22. Sivaramakrishna C, Rao C v., Trimurtulu G, Vanisree M, Subbaraju G v. Triterpenoid glycosides from *Bacopa monnieri*. *Phytochemistry*. 2005;66(23).

UNDR PEER REVIEW