



IMPORTANCE & CRITICAL REVIEW OF BRAMHI (BACOPA MONNIERA)

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ABSTRACT

Centella asiatica and Bacopa monnieri widely known as Brahmi are considered as 'Medhya rasayanas' (brain tonic). However, these plants are distinctly different. The name Brahmi, is assigned to Bacopa monnieri whereas "Mandukaparni", often confused with Brahmi, refers to Centella asiatica. Brahmi is largely treasured as a revitalizing herb used by Ayurvedic medical practitioners for almost 3000 years. The herb has been mentioned in several Ayurvedic treatises including Charaka Samhita and Sushruta Samhita. Bacopa monnieri, a traditional Ayurvedic plant, used for centuries as a memory enhancing, anti-inflammatory, analgesic, antipyretic, sedative and antiepileptic agent. The plant, extract and isolated bacosides (the major active principles) have been extensively investigated in several laboratories for their different biological activities. In addition researchers have evaluated the anti-inflammatory, cardio tonic and other pharmacological effects of Bacopa monnieri preparations/extracts. It is observed that panchanga of Brahmi is used as an ingredient in many formulations, which are effective in disease conditions like unmada (insanity), apasmara (epilepsy), jwara (fever), pandu (anemia), amlapitta (acidity), kustha (skin disease) etc. Different parts of Brahmi are used in many dosage forms; such as swarasa (juice), kwatha (decoction), lepa (paste), varti (suppository), avleha (semi-solid preparations) and many more.

KEYWORDS: Brahmi, Therapeutic importance, Bacopa monnieri Linn.

INTRODUCTION

Brahmi is derived from word "Brahma" the mythical creator of Hindu pantheon and brain is the centre of creative activity in human body, those compounds that improve brain health is called Brahmi. The first clear reference of Brahmi regarding augmentation of memory is found in Charak Samhita,^[1] where Brahmi is prescribed as a cure for mental disorder (retardation) leading to insanity. The aetiology of the mental disorder according to Charak is a combination of anxiety, weak intellect and lack of concentration. Another authentic Ayurveda treatise i.e. Susruta Samhita has described Brahmi as efficacious in loss of intellect and memory. It is classified as a "Medhya Rasayan" drugs used to improve memory and intellect (Medhya), has been used by Ayurvedic medical practitioners in India for almost 3000 years. Plants have been used in different formulations which are used in various disorders in traditional system of medicine and researchers supports that some natural compound present in it act as Nootropic activity.^[2] The herb has been mentioned in several Ayurvedic treatises including Charaka Samhita and Sushruta Samhita. In addition to being a well-known nootropic herb for centuries, it has also been used as an antispasmodic, astringent, cardio tonic, diuretic, anticonvulsant, anti-inflammatory, analgesic,

antipyretic and antiepileptic agent. The ancient Ayurvedic sages, who were also great physicians, revealed Brahmi's role in promoting Medhya (intellect), Ayushya (longevity), Rasayana (rejuvenation), Hrdhya (Heart), Balya (strength, especially mind), Jivaniya (life energy), Nidrajanana (sleep) etc. Over the centuries, the role of Brahmi in the treatment of Kustha (leprosy/skin disorder), Pandu (anemia), Meha (diabetes), Asra Vikara (blood disorders), Kasa (cough), Visa (poison), Sopha (edema), Jwara (fever), Unmada (insanity), and Manasavikara (mental disorders) has been well described. Bacopa monnieri of Scrophulariaceae is the accepted source of Brahmi.

Description of the Plant

Centella asiatica a Psychoactive medicinal plant, is found in abundance in wet soil, is a slender, tender, faintly aromatic herb which is widely cultivated in warmer parts of Asia, Australia, America and India. The herb is known as Mandookaparni in Ayurveda, Brahmi in Unani Medicine and Gotu Kola in the Western World. It looks like a creeping perennial with numerous branches and small, oblong, relatively thick leaves which are arranged opposite to each other on the stem. Flowers are small and light purple or white with four to five petals. It can grow naturally in wetland, shallow water, damp and muddy shores.

It is a weak, creeping herbaceous plant common in marshes and is called Brahmi or Nirbarhmi in vernacular languages. The whole plant is used in a variety of preparations like Brahmighritam, Mishrakasneham etc. It commonly grows throughout India, Nepal, Sri Lanka,

Pakistan, China, Taiwan, Vietnam & USA. Due to Brahmi's widespread availability across the globe, it is often recognized by different names in different regions and languages. Thus, Brahmi has a lot to offer to the medical world.

Table 1: Showing Synonyms of Brahmi.^[3,4,5,6,7,8,9,10,11]

Synonyms	B.N	P.N	S.N	K.N	M.N	R.N	D.N	A.N	H.D	L.N
Brahmi	+	-	-	-	+	-	+	+	-	+
Kapotavanka	+	-	-	-	-	-	-	-	-	-
Somavalli	+	-	-	-	-	-	-	-	-	-
Saraswathi	+	-	-	-	+	-	-	-	-	+
Satyavathi	+	-	-	-	-	-	-	-	-	+
Satyahva	-	-	-	-	+	-	-	-	-	-
Divyateja	-	-	+	-	-	-	+	-	-	-
Tiktalonika	-	-	-	-	-	-	-	+	-	-
Twastra	-	-	+	-	-	-	+	-	-	-
Mahashoudhi	-	-	+	-	-	-	+	-	-	-
Brahmacharini	-	-	-	-	+	-	-	-	+	+
Toyavalli	-	-	-	-	-	-	-	+	-	-
Jalashaya	-	-	-	-	-	-	-	+	-	-
Vaami	-	-	-	-	-	-	-	+	-	-
Brahmasuvarchala	-	-	+	-	-	-	+	-	-	-
Mastyakshi	-	-	+	-	-	-	+	-	-	+
Sustara	-	-	+	-	-	-	-	-	-	-
Soma	-	-	+	-	+	-	-	-	-	-

Vernacular names^[12]

Table 2: Showing Vernacular names of Brahmi.

Arabic	Zarazab
Bengali	Brahmi sak, Jalanimba, Vdhabini, Birmi
Bombay	Bama
Chinese	Pa-Chi-Tlien
English	Water Hyssop, Thyme leaved gratiola
Hindi	Brahmi Jalnim, Barambhi
Kannada	Nirubrahmi, Kiru brahmi, Neeruppi gida
Konkan	Brahmi Malay Breml
Malayalam	Brami, Nirbrahmi
Marathi	Nirbrahmi
Persian	Jaranab
Sanskrit	Aindri, Brahmi, Gundala, Indravalli, Jalasaya, Matyaksi,
Tamil	Nir pirami, Piramiye pundu, Vivitam campirani
Telugu	Sambrani Chettu, Neeri Sambraani mokka sambraani aaku
Urdu	Jalanim, nirabrahmi

Table 3: Showing the classification according to various authors.

Classical Text	Gana /Varga
Charaka samhita	Prajasthapana gana
Sushruta samhita	Veeratharvadi gana
Astanga sangraha	-
Nighantu	Varga
Bhavaprakasha Nighantu	Guduchyadi varga
Dhanwantari Nighantu	karaveeradi varga
Kaiyadeva Nighantu	Oshadi varga
Raja Nighantu	Parpatadi varga
Priya Nighantu	shatapushpa varga
Madanapala Nighantu	Abhayadi varga

Nighantu adarsha	Tikta lonikavarga
Shodala Nighantu	karaveeradi varga
Hrudaya deepika Nighantu	Dweepada varga
Saligrama nighantu	Guduchyadi varga
Dravyaguna vignana (P.V.sharma)	Medhyadi varga

Rasapanchaka

Table 4: Showing Rasa panchaka of Brahmi according to different authors.

Rasapanchaka	B.N	K.N	D.N	R.N	P.N	M.N	S.N	N.A
Rasa								
Tikta Rasa	+	-	+	+	+	-	+	+
Kashaya	+	-	-	+	-	-	-	+
Madhura	+	-	-	-	-	+	-	-
Guna								
Laghu	+	+	-	-	+	+	-	-
Sara	+	+	-	-	+	+	+	-
Hima	+	-	-	+	-	+	-	-
Picchila	-	-	-	-	-	-	+	-
Soumya	-	-	+	-	-	-	+	-
Sheeta	-	-	-	-	+	-	+	-
Veerya								
Sheeta	+	+	+	-	+	-	-	-
Vipaka								
Madhura	+	+	+	-	+	+	+	-
Doshagnata								
Pittahara	+	+	+	+	-	+	+	-
Kaphahara	+	+	-	-	-	+	+	-

Part used^[13] & Dose^[14]

A different parts of the plant Brahmi is used, but mainly leaves and whole plant are taken as part used in making formulation. It is used alone as swarasa in the dose of 0.5 tola – 1 tola (nearly 5ml - 10ml) and dried churna can be taken in the amount of 4 ratti – 8 ratti (500 mg – 1gm).

Phytochemistry: In view of the importance of this plant in the indigenous system of medicine, systematic chemical examinations of the plant have been carried out by several groups of researchers. Detailed investigations were first documented in 1931, when Bose and Bose reported the isolation of the alkaloid "Brahmin" from *Bacopa monneri* (BM) and other alkaloids like nicotine and herpestine have also been reported later.^[15] It was found highly toxic, when administered at a dose of 0.5 mg/kg body weight of cat, it produces a fall in the blood pressure. In therapeutic doses its action resembles with action of strychnine chemical.

The isolation of D-mannitol, saponins, hirsaponin and potassium salts by Sastri provided further details of the chemical components of BM.^[16] The major chemical entity shown to be responsible for the memory-facilitating action of BM, Bacoside A, was assigned as 3-((alpha)-L-arabinopyranosyl)-O-(beta)-D-glucopyranoside-10, 20-dihydroxy-16- keto-dammar-24-ene.^[17] It usually cooccurs with Bacoside B, the latter differ to each other only in optical.^[18] Bacosides A and B possess haemolytic activity. On acid hydrolysis, Bacosides yield a mixture of aglycones, bacogenin,^[19]

and two genuine saponins, jujubogenin and pseudojujubogenin.^[20] In addition, same authors isolated three new saponins from BM, designated as bacopasides III, IV and V.^[21] Moreover, three new phenylethnoid glycosides, viz. monnerisides I-III along with the known analogue plantainoside B have been isolated from the glycoside fraction of BM.^[22] Analysis of the leaves and stalks exposed, moisture 88.4; protein 2.1; fat 0.6; carbohydrates 5.9; crude fibre 1.05; ash 1.9 g / 100gm, calcium 202.0; phosphorus 16.0; iron 7.8; ascorbic acid 63.0; nicotinic acid 0.3 mg /100 g; and energy 38 cal / 100 g. The leaves contain a sterol C₂₆H₄₆O.H₂O, m p 76 O)^[23] Pharmacological Properties: Anti Asthmatic Activity: BM extract possessed relaxant properties in tracheal muscle of rabbit and guinea-pigs with a partial contribution by (beta)-adrenoreceptor and prostaglandins.^[24] It also produced broncho dilation in anaesthetized rats.^[25] supported the traditional use of this plant in for various respiratory ailments.^[26] Bronchodilator property of extract may be reflected by antagonism of carbachol-induced effects on inspiratory and expiratory pressures. Extract exhibited a dual action on bronchoconstriction induced by carbachol. At low doses (25 and 37 mg/kg), predominantly inhibited inspiratory pressure, but at a high dose (50 mg/kg) inhibited only expiratory pressure. This property of the plant extract implies that more than one mechanism of action may be responsible for broncho-dilation. Some of the possible mechanisms include (beta)- adrenoreceptor activation, muscarinic receptor antagonism, prostaglandin release or interference with calcium

mobilization. A more recent study by the same authors demonstrates the calcium antagonistic activity is present in ethanol extract of BM.^[27] In addition, it has been reported that BM methanolic extract exhibited a potent mast cell stabilizer, indicating the potential usefulness of BM leaves in allergic conditions.^[28] Anti cancer activity: Pre treatment with BM significantly reduced the acute stress (AS)- induced increase in the ulcer index, adrenal gland weight, plasma glucose, aspartate aminotransferase (AST), and creatine kinase (CK) (21) in cancerous patients. This was due to presence of Bacosides present in BM, which have anticancer activity. Methanolic extract exhibited potent mast cell stabilizer.^[29] activity. Bacopa monneri is a known hyper accumulator of cadmium, chromium, lead & mercury and used for phytoremediation.^[30] Anticonvulsive Bacopa has been indicated as a remedy for epilepsy in Ayurvedic medicine and animal research showed anticonvulsant activity present in it, only at high doses over extended periods of time. It has been also reported that crude water extract of BM controls epilepsy in experimental animals.^[31] The naturally it exhibited sedative effect and significantly prolonged hypnotic action of phenobarbitone. Those substances which stimulate GABA are known to possess anticonvulsant, pain relieving and sedative effects.^[32] It suggests the involvement of GABA-ergic system in mediation of central nervous system.^[33] BM was evaluated alone and in combination with phenytoin (PHT) for its effect on PA task, maximal electroshock seizures and locomotor activity in mice.^[34] Both acquisition and retention of memory showed improvement without affecting PHT anti convulsive activity. Further investigations using BM alone or in combination with other antiepileptic drugs are warranted to explore the full potential of BM in epilepsy. Antidepressant: Methanolic extract of BM possess potential antidepressant activity in rodent. When given in the dose of 20 and 40 mg/kg, orally for 5 days, the extract was found to have significant antidepressant activity in forced swim and learned helplessness models of depression and was comparable to that of imipramine.^[35] Anti inflammatory: Bacopa monneri has the ability to inhibit inflammation through modulation of pro-inflammatory mediator release.^[36] i.e. it possesses significant anti-inflammatory activity that may well be relevant to its effectiveness in the healing of various inflammatory conditions in traditional medicine.^[37] It also significantly inhibited 5-lipoxygenase (5- LOX), 15-LOX and cyclooxygenase-2 (COX-2) activities.^[38] This activity may be due to presence of the triterpenoids and bacosides in it Anti nociceptive activity: Aqueous extract of Bacopa monneri (AEBM) exhibits analgesic activity through multiple pain pathways.^[39] i.e. involvement of β 1-adrenergic, α 2 - adrenergic receptors and 5-HT receptors in analgesic activity. It was also observed that when AEBM was given in combination with naloxone did not increase the latency for analgesic effect, which indicates involvement of opioid receptors in analgesic activity. Antioxidant activity: Alcoholic and hexane extract of BM have antioxidant properties.^[40] by

inhibiting lipid peroxidation. A more recent study explored antioxidant effect of BM by other mechanism like inhibition of superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPX) activities.^[41] It was also observed that the hydro alcoholic extract of the whole BM plant exhibited an inhibitory effect on superoxide released from polymorphonuclear cells in nitro blue assay.^[42]

CONCLUSION

There is an enormous gush in Ayurvedic plants and world in excess of it has become a subject of intensive research for various aspects. There have also been substantial efforts to standardize the Ayur- vedic crude drugs as well as finished Ayurvedic medicines. However, these initiatives would imperatively need establishing correct identity of the plant drug. The long history of safe usage of Ayurvedic medicines can be extrapolated only when the botanical identity of the plant going into those medicines is established and standardized. Hence proper nomenclature and establishing their exact botanical origin is a must. Thus further study to explore the traditionally claimed unexplored activities of Brahmi has to be carried out.

REFERENCES

1. T Brahmanand. Charaka Chandrika Chikitsa Sthana: Varanasi, Chaukhambha Surbharti Publishers 2004.
2. Russo A, Borrelli F. Bacopa monneri, a reputed Nootropic plant: an overview. *Phytomedicine*, 2005; 12: 305-317.
3. Vagbhata, Astanga Hrdaya, with commentaries of Arunadatta and Hemadri, Edited by Pt.Hari Sadasiva Sastri, Re-print, Varanasi, Chaukhambha Surbharati Prakashan, 2011; 956.
4. Vaidyaacharya Keshava, Siddhamantra, Commented by Pra- kasha, Edited by P.V.Sharma, First edition, Varanasi, Chaukhamba Amarabharathi Prakashan, 1977; 113.
5. Sharma Priya Vrat, Priya Nighantu along with the author's Hindi com- mentary entitled Padma, Edition, Varanasi; Chaukhamba Surabharathi Prakashana, 2004; 275.
6. Pt.Tripathi Hariprasad, Dhanwantari Nighantu, with Hari hindi commentary, Re-print, Varanasi, Chowkhambha Krishnadas Academy, 2008; 294.
7. Sri Bhavamisra, Bhavaprakasa Nighantu, Commentary by Prof.K.C.Chunekar, Edited by Dr.G.S.Pandey, Revised edition, Varanasi, Chaukhambha Bharati Academy, 2010; 960.
8. Pandit Narahari, Rajanighantu, written by Dr.Indradev Tripathi, edited with Dravyagunaprakasha hindi commentary, Revised edition, Varanasi, Chowkhambha Krishnadas Academy, 2010; 703.
9. Acharya Kaiyadeva, Kaiyadeva Nighantu (Pathyapathya Vibho- dhaka), edited by Prof.Priya Vrat Sharma, Dr.Guru Prasada Sharma, First edition, Varanasi, Chau- khambha Orientalia, 1979; 696.

10. Nrupa Madanapala, Madanapala nighantu, edited by Gangavishnu srikrishnadasa, printed in, 1961; 296.
11. Acharya Shodhala, Shodhala Nighantu, Commented by Prof.Gyanendra pandey, Edited by Prof. R.R. Dwivedi, First edition, Varanasi, Chowkhambha Krishnadas Academy, 2009; 538.
12. Kirtikar.K.R. and Basu.B.D., Indian Medicinal plants with Illustrations, Revised by E.Blatter, J.F.Caius and K.S.Mhaskar, Second edition, Oriental Enterprises, 2001; 1724.
13. Dr. Gyanendra Pandey. Dravyaguna Vijnana vol-1. 2 nd edn., Varanasi; Krishnadas Academy, 2002; 435.
14. Bhavamishra, Pandey GS editor. Bhavaprakasha Nighantu. 1st edn., Varanasi; Chaukhambha Bharati Academy, 2006; 462.
15. Chopra RN, Nayar L, Chopra IC. Glossary of Indian Medicinal Plants. vol. 32. Council of Scientific and Industrial Research, New Delhi, 1956.
16. Shastri MS, Dhalla NS, Malhotra CL. Chemical investigation of *Herpestis monneri* Linn (Brahmi). *Indian J. Pharmacol*, 1959; 21: 303-304.
17. Chatterji N, Rastogi RP, Dhar ML. Chemical examination of *Bacopa monneri* Wettst.: partitioning of chemical constituents. *Indian J. Chem*, 1959; 3: 24-29.
18. Rastogi RP. Compendium of Indian Medicinal Plants. CSIR, New Delhi, 1990; 1: 118-122.
19. Chandel RS, Kulshreshtha DK, Rastogi RP. Bacogenin (A.sub.3): a new sapogenin from *Bacopa monneri*. *Phytochemistry*, 1977; 16: 141-143.
20. Rastogi S, Pal R, Kulshreshtha DK. Bacoside A3-a triterpenoid saponin from *Bacopa monneri*. *Phytochemistry*, 1994; 36: 133-137.
21. Chakravarty AK, Garai S, Masuda K, Nakane T, Kawahara N. Bacosides III-V: three new triterpenoid glycosides from *Bacopa monneri*. *Chem. Pharm. Bull*, 2003; 51: 215- 217.
22. Chakravarty AK, Sarkar T, Nakane T, Kawahara N, Masuda K. New phenylethanoid glycosides from *Bacopa monneri*. *Chem. Pharm. Bull*, 2002; 50: 1616-1618.
23. http://herbalnet.org/wholherb/bacopa_mon.as ps
24. Dar A, Channa S. Bronchodilatory and cardiovascular effects of an ethanol extract of *Bacopa monniera* in anaesthetized rats. *Phytomedicine*, 1997b; 4: 319-323.
25. Nadkarni KM. *The Indian Materia Medica*. Columbia, MO: South Asia Books, 1988; 624-625.
26. Dar A, Channa S. Calcium antagonistic activity of *Bacopa monniera* on vascular and intestinal smooth muscles of rabbit and guinea-pig. *J. Ethnopharmacol*, 1999; 66: 167-174.
27. Sharma R, Chaturvedi C, Tewari PV. Efficacy of *Bacopa monnieri* in revitalizing intellectual functions in children. *J Res Edu Indian Med*, 1987; Jan-June: 1-12.
28. Negi KS, et al. Clinical evaluation of memory enhancing properties of Memory Plus in children with attention deficit hyperactivity disorder. *Ind. J Psychiatry*, 2000; 42: Supplement. (Abstract).
29. Rai D, Bhatia G, Palit G and Pal R. Adaptogenic effect of *Bacopa monneri* (Brahmi), *Pharmacol. Biochem. Behav*, 2003; 75: 823-830.
30. Samiulla DS, Prashanth D, Amit A. Mast cell stabilising activity of *Bacopa monnieri*, *Fitoterapia*, 2001; 72: 284- 285.
31. Tripathi YB, Chaurasia S, Tripathi E and Upadhyay A. *Bacopa monniera* Linn. as an antioxidant: mechanism of action, *Indian J. Exp. Biol*, 1996; 34: 523-526.
32. Shanmugasundaram ER, Akbar GK, Shanmugasundaram KR. Brahmiherb, an Ayurvedic herbal formula for the control of epilepsy. *J. Ethnopharmacol*, 1991; 33: 269-276.
33. Singh HK, Shanker G, Patnaik GK. Neuropharmacological and anti-stress effects of bacosides: a memory enhancer: *Indian J. Pharmacol*, 1996; 28: 47.
34. Shanker G, Singh HK. Anxiolytic profile of standardized Brahmi extract: *Indian J. Pharmacol*, 2000; 32: 152.
35. Vohora D, Pal SN, Pillai KK. Protection from phenytoin-induced cognitive deficit by *Bacopa monneri*, a reputed nootropic plant: *J. Ethnopharmacol*, 2000; 71: 383-390.
36. Sairam K, Dorababu M, Goel RK, Bhattacharya SK. Antidepressant activity of standardized extract of *Bacopa monniera* in experimental models of depression in rats: *Phytomedicine*, 2002; 9: 207-211.
37. Viji V, Helen A. Inhibition of proinflammatory mediators: role of *Bacopa monniera* (L.) Wettst, *Inflammo J. Ethnopharmacol*, 2010.
38. Channa S, Dar A, Anjum S and Yaqoob M. Anti-inflammatory activity of *Bacopa monniera* in rodents: *J. Ethnopharmacol.*, 2006; 104(1-2): 286- 289.
39. Viji V and Helen A. Inhibition of lipoxygenases and cyclooxygenase-2 enzymes by extracts isolated from *Bacopa monniera* (L.) Wettst, *J. Ethnopharmacol.*, 2008; 23: 118(2): 305-311.
40. Manju B, Jagtap AG. Exploring the possible mechanisms of action behind the antinociceptive activity of *Bacopa monniera* *Int J Ayurveda Res*, 2011; 2: 2-7.
41. Tripathi YB, Chaurasia S, Tripathi E, Upadhyay A, Dubey GP. *Bacopa monniera* Linn. as an antioxidant: mechanism of action: *Indian J. Exp. Biol*, 1996; 34: 523-526.
42. Bhattacharya SK, Bhattacharya A, Kumar A, Ghosal S. Antioxidant activity of *Bacopa monniera* in rat frontal cortex, striatum and hippocampus: *Phytother. Res.*, 2000; 14: 174-179.
43. Pawar R, Gopalakrishnan C, Bhutani KK. Dammarane triterpene saponin from *Bacopa monniera* as the superoxide inhibitor in polymorphonuclear cells: *Planta Med*, 2001; 67: 752-754.