CPE POINTS SEE PAGE 59

BOTANICAL MEDICINE

Brahmi

Bacopa monniera

New research, much of it local, suggests that India's ancient 'wisdom plant' is relevant to today's patient in search of optimal health, finds Lesley Braun**.**

Brahmi is the Sanskrit name for the herb *Bacopa monniera* L, of the Scrophulariaceae family, which has been used in Ayurvedic medicine as a nerve tonic since time immemorial. In the Ayurvedic system, *B. monniera* has been categorised under *medhya rasayana* i.e., medicinal plants rejuvenating intellect and memory. The ancient classical Ayurvedic treatises recommended it for the promotion of memory, intelligence and general performance. It is claimed that teachers or *rishis* administered brahmi to their disciples at religious schools to enhance their memory ability for reciting Vedic hymns. As a result, brahmi has been investigated in several laboratories, predominantly in India, for its neuropharmacological effects.

Results from *in-vitro* and *in-vivo* studies have indicated that Brahmi exerts a myriad of neuropharmacological actions that could account for its traditional memory-enhancing claim. Various experiments have identified potent anti-oxidant activity[1] that has been demonstrated in all areas of the brain *in vivo*. Significant antidepressant activity has been observed for brahmi extract in a rodent model of depression, which is comparable to imipramine after five days of oral administration.[2] Additionally, anticholinesterase activity has been demonstrated *in vitro* and *in vivo*.[3]

Lab tests reveal possibilities

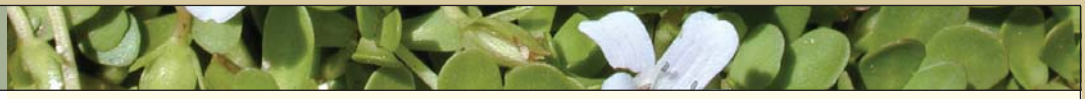
Besides these neuropharmacological actions, numerous others also exist. Animal experiments have found that brahmi increases thyroxine (T4) concentrations by 41 per cent[4] and a methanolic fraction exerts potent mast cell-stabilising activity *in vitro* that is comparable to disodium cromoglycate.[5]

The herb's anti-oxidant activity is not limited to the brain. *In-vitro* tests have identified significant anti-oxidant effects in the liver[6], with decreased hepatic lipid peroxidation and increased activity of superoxide dismutase and catalase.[7] Additionally, a significant anti-ulcer activity has been reported for the fresh juice of the whole plant in an animal model of aspirin-induced gastric ulceration.[8] Brahmi appears to beneficially influence the natural mucosal defense by increasing mucin secretion, mucosal glycoprotein production and decreasing cell shedding. *In-vivo* results further indicate the herb has a spasmolytic effect on smooth muscle, which is predominantly due to inhibition of calcium influx into the cell.[9]

Although bacopa has many different pharmacological mechanisms, it is mainly clinically used for its effects on the nervous system, particularly to improve learning capacity and memory and also alleviate the adverse effects of stress.

Cognitive effects

The cognitive-enhancing property of *B. monniera* has been observed in several experimental models of learning. Singh

Factfile	
Indications	anxiety, cognitive decline, insomnia, memory loss, neurasthenia
Pharmacology	anti-oxidant, anxiolytic, anti-inflammatory, cognition-enhancing, immuno-modulating, mild sedative, mild anticonvulsant
Constituents	steroidal saponine glycosides [bacopasides (monnierin, hersaponin, bacosides A and B)], alkaloids (herpestine and brahmine), flavonoid glycosides, betulic acid and phytosterols
Products	capsule, tablet, liquid extract, powdered herb, tea
Therapeutic dosage	tablet: 500 mg/day standardised to 40% bacosides dried herb: 2–6 g/day liquid extract: 5–13 mL/day (1:2) powdered herb: 5–10 g (Indian Herbal Pharmacopoeia 1998) tea: 8–18 mL (*CRC Handbook of Ayurvedic Medicinal Plants* 1990)
Precautions	generally well tolerated but may cause GI irritation in some individuals
Interactions	none known

and Dhawan demonstrated positive effects on learning skills, memory and reaction times compared to controls in one rat study.[10] Another study found bacopa improves both the acquisition and retention of memory induced by the drug phenytoin, without affecting the anticonvulsant activity of the drug.[11] More recently, animal studies have found bacopa attenuates scopolamine-induced dementia.[12]

Readers familiar with the significant effects of *Ginkgo biloba* on memory [see *JCM* 2002;1(3):56–60], may ask how it compares to brahmi in this regard. The previous group of researchers has also conducted tests comparing the effects of standardised *B. monniera* extract (containing 55–60% bacosides) 30 mg/kg to three different strengths of standardised ginkgo extract (15, 30 and 60 mg/kg; Ginkocer, Ranbaxy Laboratories, India) in an experimental learning model, the passive avoidance test.[12] They showed that although both herbal treatments were able to reverse scopolamine-induced deficits, ginkgo extracts appeared to induce more learning than the bacopa extracts and further tests suggested that it also had stronger anti-cholinesterase activity.

Currently, there are only a few double-blind studies that have investigated the effects of brahmi as a cognitive activator in adults.

Stough et al conducted a double-blind, placebo-controlled trial using a dose of 300 mg *B. monniera* standardised to ≥55% bacosides (Keen Mind, Central Drug Research Institute of India) over 12 weeks in healthy volunteers.[13] At this dose, brahmi significantly improved the speed of visual-information processing, learning rate and memory consolidation, with maximal effects evident after 12 weeks. A significant reduction in anxiety was also observed. Another study of same design tested the same brahmi product in 76 adults over three months.[14] This study found the herb produced a significant effect on a test for the retention of new information but no changes to the rate of learning, suggesting treatment decreases the rate of forgetting newly acquired information. A further double-blind, placebo-controlled study involving 38 people was published earlier, using a 300 mg dose of brahmi (Keen Mind).[15] This time, neuropsychological testing was conducted before and two hours after drug administration, resulting in no significant changes to cognitive functioning. These results suggest that brahmi does not exert cognitive activator activity after a single dose and that treatment of two-to-three months may be required for effects to become established.

Brahmi is sometimes used in the treatment of childhood ADHD, however, no double-blind studies could be located to determine whether it is an effective treatment.

Adaptogenic/anti-stress activity

Considerable evidence published in the last decade has focussed on alterations of neurochemical, biochemical and molecular effects in the nervous, endocrine and immune systems caused by stress. Particular emphasis has been placed on the intrinsic role of the hypothalamic–pituitary–adrenal (HPA) axis in these responses. Although stress-induced changes are usually self-limiting, chronic exposure to stress at levels that override an individual's threshold for adaptation can result in maladaptive and irreversible pathological changes. This is sometimes described in the medical literature as allostatic load.

In herbal medicine, 'adaptogenic' agents, such as ginseng, are widely used to support the body's adaptive processes so

that chronic stress does not lead to permanent or harmful effects. A recent study conducted with experimental animals has investigated the adaptogenic properties of brahmi in acute and chronic stress models, producing encouraging results.[16]

In an acute stress model, pretreatment with *B. monniera* (standardised to 55–60% bacosides) at 40 mg/kg significantly reduced stress-induced increases in the ulcer index, adrenal gland weight, plasma glucose, AST and CK. A larger dose of 80 mg/kg also significantly reversed the stress-induced changes in spleen weight. Results from the chronic stress model were also encouraging. Pretreatment with the higher dose of brahmi significantly reversed stress-induced changes in ulcer index, adrenal hypertrophy, CK and AST, whereas the lower dose only reversed changes in ulcer index and plasma AST. According to these results, *B. monniera* demonstrates anti-stress activity in both acute or chronic stress situations, by attenuating the systemic HPA axis response.[16]

A herb by any other name

The name 'brahmi' is used to refer to the herb *B. monniera* in the Sanskrit literature and in India, whereas in the US, the name is also used to refer to another herb, *Centella asiatica*. *C. asiatica* is commonly known as gotu kola and, although it has some similar properties and related constituents to *B. monnieri*, the two should not be confused.

Pharmacists – dosages

In practice, the dose used is typically 2–6 g/day of dried herb or 5–12 ml of 1:2 fluid extract daily for adults and 2.5–6 ml/day of 1:2 fluid extract for children aged 6–12 years. Clinical studies have found that cognitive effects develop over several months, so long-term treatment may be required. It is recommended that people with hyperthyroidism avoid using brahmi, as it has been shown to significantly elevate T4 levels *in vivo*.

Reference List

1 Tripathi YB, Chaurasia S, Tripathi E, et al. Bacopa monniera Linn. as an antioxidant: mechanism of action. Indian J Exp Biol 1996;34(6):523–6.

2 Sairam K, Dorababu M, Goel RK, et al. Antidepressant activity of standardized extract of Bacopa monniera in experimental models of depression in rats. Phytomedicine 2002;9(3):207–11.

3 Das A, Shanker G, Nath C, et al. A comparative study in rodents of standardized extracts of Bacopa monniera and Ginkgo biloba. Anticholinesterase and cognitive enhancing activities. Pharmacol Biochem Behav 2002;73(4):893–900.

4 Kar A, Panda S, Bharti S. Relative efficacy of three medicinal plant extracts in the alteration of thyroid hormone concentrations in male mice. J Ethnopharmacol 2002;81(2):281–5.

5 Samiulla DS, Prashanth D, Amit A. Mast cell stabilising activity of Bacopa monnieri. Fitoterapia 2001;72(3):284–5.

6 Bhattacharya SK, Bhattacharya A, Kumar A, et al. Antioxidant activity of Bacopa monniera in rat frontal cortex, striatum and hippocampus. Phytother Res 2000;14(3):174–9.

7 Kar A, Panda S, Bharti S. Relative efficacy of three medicinal plant extracts in the alteration of thyroid hormone concentrations in male mice. J Ethnopharmacol 2002;81(2):281–5.

8 Rao CV, Sairam K, Goel RK. Experimental evaluation of Bocopa monniera on rat gastric ulceration and secretion. Indian J Physiol Pharmacol 2000;44(4):435–41.

9 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(2):167–74.

10 Singh HK, Dhawan BN. Effect of Bacopa monniera Linn. (brahmi) extract on avoidance responses in rat. J Ethnopharmacol 1982;5(2):205–14.

11 Vohora D, Pal SN, Pillai KK. Protection from phenytoin-induced cognitive deficit by Bacopa monniera, a reputed Indian nootropic plant. J Ethnopharmacol 2000;71(3):383–90.

12 Das A, Shanker G, Nath C, et al. A comparative study in rodents of standardized extracts of Bacopa monniera and Ginkgo biloba. Anticholinesterase and cognitive enhancing activities. Pharmacol Biochem Behav 2002;73(4):893–900.

13 Stough C, Lloyd J, Clarke J, et al. The chronic effects of an extract of Bacopa monniera (Brahmi) on cognitive function in healthy human subjects. Psychopharmacology (Berl) 2001;156(4):481–4.

14 Roodenrys S, Booth D, Bulzomi S, et al. Chronic effects of Brahmi (Bacopa monnieri) on human memory. Neuropsychopharmacology 2002;27(2):279–81.

15 Nathan PJ, Clarke J, Lloyd J, et al. The acute effects of an extract of Bacopa monniera (Brahmi) on cognitive function in healthy normal subjects. Hum Psychopharmacol 2001;16(4):345–51.

16 Rai D, Bhatia G, Palit G, et al. Adaptogenic effect of Bacopa monniera (Brahmi). Pharmacol Biochem Behav 2003;75(4):823–30.

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CPE article 14: brahmi

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Q Circle the most appropriate answer to the following questions. More than one answer may be correct.

1 Brahmi is also known as

a) Bacopa
b) *B. monniera*
c) Ginkgo
d) Ginseng

2 Brahmi exerts the following pharmacological effects

a) Antibiotic
b) Spasmolytic
c) Anti-inflammatory
d) Anticholinesterase

3 In clinical practice, brahmi is used to treat

a) infection
b) intermittent claudication
c) ADHD
d) poor memory

4 Clinical studies have shown that brahmi

a) improves the speed of visual information processing, learning rate and memory consolidation
b) reduces anxiety
c) has antihistaminic activity
d) has anti-ulcer activity

5 Although generally considered safe, brahmi should not be used by people with

a) anxiety disorders
b) gout
c) hyperthyroidism
d) restless legs

CPE ARTICLE 13 ANSWERS: GARLIC
JCM 2004;3(4):60 – JULY/AUGUST 2004
1. d 2. b 3. a, b, c, d 4. c, d 5. a, b, c, d

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