

Egyptian Herbal Monograph

Volume 1

Wild Medicinal Plants

Egyptian Drug Authority (EDA)

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***Bacopa monnieri* (L.) Wettst.**

باكوبا

1. Names & Synonyms (1)

Bacopa monnieri (L.) Wettst.

Family: Plantaginaceae.

Syns.: *Anisocalyx limnanthiflorus* (L.) Hance, *Bramia monnieri* (L.) Drake, *Gratiola monnieri* (L.) L., *Herpestis monnieri* (L.) Rothm., *Moniera monnieri* (L.) Britton, *Lysimachia monnieri* L.

Arabic: Bacoba باكوبا

English name: Bacopa, water hyssop (2) and Moneywort (3).

2. Geographical distribution

- Nile region, Desert east of the Nile including that of Sinai (4).

3. Parts used for medicinal purpose

- Aerial parts (leaves and stems) (3-6).

4. Major chemical constituents

- **Saponins:** Bacoside A (a mixture of bacoside A₃, Bacopasides II & X, and Bacopasaponin C) and bacoside B (7-9).
- **Alkaloid:** Brahmine, nicotine and herpestine (10).
- **Flavonoids:** Apigenin, luteolin and quercetin (11).
- **Phenylpropanoids:** Plantainoside B and monnierasides I-III (12).
- **Triterpenes:** Cucurbitacin (13) and betulinic acid (14).
- **Amino acids:** Glutamic and aspartic acids, α-alanine and serine (13).
- **Sugars:** D-mannitol (13).
- **Sterols:** Stigmastanol, β-sitosterol and stigmasterol (14).

5. Traditional medicinal uses (3,4,6,15)

- Improve memory performance and cognitive functions.
- Neuroprotection against Alzheimer's disease.
- Reduce anxiety.

B. monnieri is a traditional medicinal plant for use in the specified indications based exclusively upon long-standing use.

Herbal preparations correlated to medicinal use

- 1) Powdered drug (3, 16, 6).
- 2) Dry ethanolic extract (3).
 - 2.1 Standardized to 20% bacosides A and B (17).
 - 2.2 Standardized to 40- 55% bacosides A and B (3).
- 3) Fluid extract (1:2) (3, 17).
- 4) Tincture (1:5) (3).

Herbal preparations are in pharmaceutical dosage forms. The pharmaceutical form should be described by the pharmacopoeia full standard term.

6. Posology and method of administration correlated to medicinal use

Preparation 1

Adults and elderly

1–10 gm, daily (3,6,16-18).

Preparation 2

Preparation 2.1

Adolescents, adults and elderly

200 - 400 mg, daily in divided doses (17,18).

Children 6 - 12: 100 - 200 mg, daily in divided doses (17).

Preparation 2.2

Adolescents, adults and elderly:

300 mg, daily in divided doses (3).

Preparation 3 (17)

Adolescents, adults and elderly

- 5 - 12 ml daily in divided doses (17).
- Equivalent to 1 - 6.5 gm, daily (3).

Children 6 - 12: and 2.5 - 6 ml, daily (17).



Preparation 4

Adults and elderly

- Equivalent to 1 - 6.5 gm, daily (3).
- 10 – 20 ml, daily in 2 – 3 divided doses (19).

Duration of use: Use for at least 6 weeks to see beneficial effects (3).

Method of administration: Oral use (3).

7. Contraindications

- Hypersensitivity to the active substances and to other plants of the same family.

8. Special warnings and precautions for use

- If the symptoms worsen during the use of the medicinal product, a doctor or a pharmacist should be consulted.
- *Bacopa monnieri* may inhibit the acetylcholinesterase enzyme, which may result in increased acetylcholine levels. As a result, *Bacopa* could counteract the effects of anticholinergic drugs and may worsen bradycardia and exacerbate conditions such as gastrointestinal obstruction, peptic ulcer disease, pulmonary conditions such as asthma, and chronic obstructive pulmonary disease or urogenital tract obstruction (19).

9. Interactions with other medicinal products and other forms of interaction

- None reported (3).

10. Fertility, pregnancy and lactation (3)

- Safety during pregnancy and lactation has not been established. In the absence of sufficient data, the use during pregnancy and lactation is not recommended.
- No fertility data available.

11. Effects on ability to drive and use machines

- No studies on the effect on the ability to drive and use machines have been performed.

12. Undesirable effects

- Digestive disorders including increased stool frequency, nausea, and abdominal cramps (3, 19).

13. Overdose

- No case of overdose has been reported.

14. Relevant biological activities

Human studies

- In a small (17 patients) randomized control trial, 320 mg and 640 mg), *Bacopa* extract standardized for no less than 55% of total bacosides showed a statistically significant improvement in cognitive performance (mental arithmetic, Stroop, letter search, visual tracking), improved mood, and a decreased cortisol response from stress after one dose of *Bacopa*. A stronger effect was observed with the 640 mg dose (20).
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- A small study (30 subjects) evaluated a daily dose of 450mg over a 12-week period in healthy adults, demonstrated no significant change in cognitive testing scores (learning and memory, information processing), but a trend for decreased anxiety in the *Bacopa* group (21).
- A meta-analysis incorporating nine randomized controlled trials (437 subjects) demonstrated that *Bacopa monnieri* has the potential to improve cognition, particularly speed of attention. (22).
- In a randomized, double-blinded, placebo-controlled study, patients (54 adults) given a 300 mg standardized extract of either *Bacopa* or placebo for 12-week demonstrated enhanced delayed word recall memory scores and increased ability to ignore irrelevant information (Stroop's test), relative to placebo (23).
- In a randomized, a double-blinded study (81 adults 55 years and older) reported that a 12- week cycle of *Bacopa* significantly improved memory acquisition and retention in healthy older Australians (24).
- A meta-analysis incorporating results from six studies with 12 weeks or greater duration found that *Bacopa* improved memory-free recall but did not improve other aspects of cognition. These studies used a 300 to 450 mg dose of *Bacopa* extract standardized to 10 to 20% *Bacopa* glycosides (25).
- A randomized double blind placebo-controlled study was planned to evaluate the efficacy of *Bacopa monnieri* on memory of medical sixty students. The participants were randomly divided in two groups to receive either 150 mg of standardized extract of *Bacopa monnieri* (Bacognize) or

- matching placebo twice daily for six weeks. Statistically significant improvement was seen in the tests relating to the cognitive functions with use of *Bacopa monnieri* (26).
- Bacoside A, Bacoside B, Bacosaponins, Betulinic acid, *etc*; are the bioactive component of Brahmi. Each chemical component known have its significant role in neuroprotection. The neuroprotective properties of Brahmi and its bioactive components including reduction of ROS, neuroinflammation, aggregation inhibition of Amyloid- β and improvement of cognitive and learning behaviour. The overall studies have concluded that Brahmi can be used as a lead formulation for treatment of Alzheimer's disease and other neurological disorders (27).

Animal studies

- In a study on male albino mice, *Bacopa monnieri* extract was administered along with phenytoin in the second week of a two-week trial. There was a significant reversal of phenytoin-induced cognitive impairment with improved acquisition and retention of memory and no effect on the anticonvulsant activity (28). Some animal studies suggest a benefit from *Bacopa monnieri* for Alzheimer disease (29), epilepsy (30, 31), Parkinson disease (32,33) and cerebral ischemia/infarct (34-36). It has been shown to cure gastric ulcers in animals and have anti-*Helicobacter pylori* activity in human colonic tissue (37, 38).
- Bacosides, class of compounds extracted from the *Bacopa monniera* plant, exhibited interesting therapeutic properties, particularly enhancing cognitive functions and putative anti-amyloid activity. The bacoside-A exerted significant effects upon fibrillation and membrane interactions of the amyloidogenic fragment of the prion protein [PrP(106-126)] (39).

15. Additional Information

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16. Date of last compilation/last revision

25/12/2023

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