

# Physico-Chemical Insights into Brahmi (*Bacopa monnieri*): The Magical Herb

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## ABSTRACT

Brahmi (*Bacopa monnieri*), a small creeping herb belongs to the family *Scrophulariaceae*. Brahmi is one of the oldest healing herbs reported in Ayurvedic medicines, it is known as water hyssop, herb of grace, thyme leaved gratiola and Indian pennywort. The fresh brahmi leaves were collected and the physico-chemical properties of brahmi leaves such as moisture content (w.b.), crude protein, total phenols, total flavonoids, water activity, pH and ascorbic acid were estimated. Fresh brahmi is reported to contain higher amounts of total phenol and flavonoids and also it is rich in ascorbic acid content. Brahmi, known as the "magical herb," holds a prominent place in traditional medicine due to its diverse therapeutic qualities. This widely recognized herbal remedy effectively improves nervous system function, bolsters memory retention, and mitigates convulsions and inflammation. Brahmi's potency extends beyond medicinal applications, as it is rich in antioxidants, making it a valuable addition to daily nutrition. In addition to improving sleep, it also removes toxins from the body, improves blood circulation, and aids in the treatment of joint issues. It can be seamlessly incorporated into diets in various forms such as powder, pills and ghrita (clarified butter). The herb's multifaceted benefits, coupled with its adaptability for consumption, underscore its importance as a versatile and accessible herbal supplement, contributing to both mental well-being and overall health.

**Key words:** *Bacopa monnieri*, Brahmi, Antioxidants, Memory enhancer

## Introduction

Traditional medicine has been using medicinal herbs for centuries due to their therapeutic benefits. India is the second largest exporter of medicinal plants. India and China with 6,600 medicinal plants and produce more than 70 per cent of the demand for medicinal herbs in the worldwide (Chowti *et al.*,

2018). Plant-based herbal medicines can be prepared from any portion of the plant, leaves, roots, barks, seeds and flowers, *etc.* They can be consumed, ingested, drunk or inhaled. 'Active principles' or 'active ingredients' are the substances that are recognized to have therapeutic value (Kunle *et al.*, 2012). Plant based traditional medicines play a crucial role in the growth and advancement of contemporary

drug research. A number of medicines have been synthesized from traditional medicinal plants. Uses of these plants are a vital resource and demand in developing nations, especially in rural areas. It also offers alternative to primary healthcare systems (Mintah *et al.*, 2019; Salmeron *et al.*, 2020).

Brahmi (*Bacopa monnieri*), a small creeping herb belongs to the family Scrophulariaceae. It is known as water hyssop, herb of grace, thyme leaved gratiola, Indian pennywort. Aublet initially defined the genus *Bacopa* in 1775. He named the species *Bacopa aquatica* after the type specimen and the term *Bacopa* was derived from the Latin (Dubey and Chinnathambi, 2019; Sudhakaran, 2020). The pharmacological and biochemical qualities of the brahmi plant make it useful as herbal supplements and as a memory enhancer, and also for stopping hair loss (Pandey *et al.*, 2020).

Brahmi has been used as an ingredient in a number of unique ayurvedic formulations, including hair oils, manasamitra vatakam, saraswatha ghrutham, saraswatharishtam, saraswatha churna, and brahmi keram. Its several uses have helped it gain acceptance as a functional food ingredient in the food processing industry. Due to these several uses, brahmi has seen a significant increase in demand, which has caused India to classify it as a “herb of high volume trade” with an annual trade value between 2000 and 5000 MT (Sukumaran *et al.*, 2019).

## Materials and Methods

The fresh brahmi (*Bacopa monnieri*) leaves were collected from Swastik farm, Pandoli, Gujarat and brought to the Department of Processing and Food Engineering, College of Technology and Engineering, Maharana Pratap University of Agriculture and Technology, Udaipur, Rajasthan to carry out the experiments. Physiologically matured fresh green brahmi leaves were selected for analysis.

### Moisture content

The moisture content of brahmi leaves were estimated using hot air oven as per AOAC (2016) method at 105 °C for 16-18 h. The moisture content of the sample was determined by using the following formula:

### Crude protein

The crude protein content of brahmi leaves was es-

timated by using Micro-Kjeldahl instrument as described by AOAC (2016) based on the estimation of the sample's amount of reduced nitrogen. The per cent nitrogen was estimated and the protein content was quantified by multiplying with the factor 6.25.

### Total phenols

The total phenols (mg GAE/100 g) of brahmi leaves was determined by using Folin Ciocalteu Reagent (FCR) by spectro-photometric method and the absorbance was measured at 750 nm (AOAC, 2016).



Plate 1. 7 Spectrophotometer

### Total flavonoids

The total flavonoids (mg RE/100 g) of brahmi leaves was determined by using Rutin solution by spectro-photometric method and absorbance was measured at 510 nm (AOAC, 2016).

### Water activity

The water activity ( $a_w$ ) may be defined as the availability of water for the growth of microorganisms. The water activity of the brahmi leaves were determined by water activity meter (Novasina, Switzerland).

### pH

The pH of juice was measured using Michigan digital pH meter. The meter was calibrated using buffer capsules of pH=4, pH=7 and pH=10. The cell of the meter was directly immersed into the experimental solution and pH was measured.

### Ascorbic acid

The ascorbic acid content was estimated by 2, 6-Dichlorophenol Indophenol visual titration method (Ranganna, 2002).

## Results and Discussion

The physico-chemical properties of brahmi leaves such as moisture content (w.b.), crude protein, total

**Table 1.** Physico-chemical properties of brahmi leaves

Parameter	Maximum value	Minimum value	Mean value	± S.D value
Moisture content, per cent (w.b.)	90.04	86.98	88.51	1.53
Crude protein, per cent*	2.49	2.37	2.43	0.06
Total phenols, mg GAE/100 g	25.23	21.67	23.45	1.78
Total flavonoids, mg RE/100 g	32.18	28.74	30.46	1.72
Water activity	1.03	0.79	0.91	0.12
pH	6.92	5.83	6.38	0.55
Ascorbic acid, mg/100 g	66.27	61.84	64.06	2.21

phenols, total flavonoids, water activity, pH and ascorbic acid were estimated, and their maximum, minimum, mean and standard deviations values were tabulated in Table-I.

### Moisture content

The average moisture content (w.b.) were recorded as  $88.51 \pm 1.53$  per cent. Similar results were reported by Silpa *et al.* (2021), which was  $88.76 \pm 0.08$  per cent for brahmi leaves.

### Crude protein

The average crude protein were recorded as  $2.43 \pm 0.06$  per cent. The results are in agreement with Devendra *et al.* (2018) of 2.1 per cent for the brahmi leaves.

### Total phenols

The average total phenols were found to be  $23.45 \pm 1.78$  mg GAE/100 g. Similar results were reported by Mondal *et al.* (2023) recorded to be  $587.6 \mu\text{g}/\text{ml}$  for brahmi leaves.

### Total flavonoids

The average total flavonoids were recorded as  $30.46 \pm 1.72$  mg RE/100 g. The results are in line with the results given by Mondal *et al.* (2023) which was  $575.4 \mu\text{g}/\text{ml}$ .

### Water activity

The average water activity were recorded as  $0.91 \pm 0.12$ . Similar results were reported by Silpa *et al.* (2021), which was 0.90 for brahmi leaves.

### pH

The average pH were recorded as  $6.38 \pm 0.55$ . The results are in line with the results given by Mondal *et al.* (2023) which was found in the range of 5-7.5.

### Ascorbic acid

The average The average ascorbic acid value were

recorded as  $64.06 \pm 2.21$  mg/100 g. Similar results were reported by Devendra *et al.* (2018) of 63.00 mg/100 g for the brahmi leaves.

### Conclusion

Based on the research, fresh brahmi is reported to contain higher amounts of total phenol and flavonoids and also it is rich in ascorbic acid content. Brahmi can be taken as a powder, oil, paste, pill, liquid extract, or capsule, and it has positive effects on the liver and the immune system entirety. It possesses anti-aging and antioxidant effects that encourage collagen and cell regeneration. It can be incorporated into Ayurvedic and pharmaceutical medications.

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### Conflict of Interest

Authors have no conflict of interest.

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