

## PRELIMINARY PHARMACOGNOSTIC STUDY OF BRAHMI

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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*. A detailed investigation of whole plant of both the crude drugs was carried out. Various physicochemical parameters were also established. Phytochemical screening revealed the presence of many therapeutically important classes of phytoconstituents such as glycosides, alkaloids, saponins, proteins and carbohydrates. The present work was undertaken to generate information regarding relevant pharmacognostical, phytochemical and physicochemical data needed for proper identification and authentication of two crude drugs belonging to two different families, mainly focusing and exploring the aspects leading to common effect of improving memory.

**Key words:** *Centella asiatica*, *Bacopa monnieri*, pharmacognosy, *Medhya rasayanas*

## INTRODUCTION

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 Brahmi is one of the best herbs for balancing and rejuvenating pitta, while at the same time strongly reducing kapha. It enhances the quality of *Sadhaka pitta* which directly influences the nature of consciousness. The ancient texts revealed Brahmi's role in promoting *medhya* (intellect), *ayushya* (longevity) and as a *rasayana* (rejuvenation).<sup>1</sup> 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.<sup>2</sup> In addition to being a well-known nootropic herb for centuries, it

has also been used as an antispasmodic, alterative, astringent, cardio tonic, diuretic, anti-convulsant, anti-inflammatory, analgesic, antipyretic and antiepileptic agent. *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*. Evaluation of both the plants on various pharmacognostic and phytochemical parameters mainly focusing and exploring the aspects leading to common effect of improving memory is the need.

## MATERIALS AND METHODS

**Collection and authentication of plant material :** The drugs Mandukaparni (*Centella asiatica*) and Brahmi (*Bacopa monnieri*) were collected from Mandya District. The genuinity of the trial drug is confirmed by Mr.Ganesh Babu, Botanist,

Institute of Ayurveda and Integrative Medicine, FRLHT, Yelahanka, Bangalore.

**Preparation of samples:** The drugs Mandukaparni (*Centella asiatica*) and Brahmi (*Bacopa monnieri*) were collected from natural habitat. Leaves were carefully checked for the presence of infested ones and samples were dried under shade. Completely dried leaves were then pounded to convert them in to fine powder and filtered using cloth and preserved in air-tight containers.

**Organoleptic study:** The macroscopic characters of the sample were observed for colour, size, shape, odour, taste and fractures.

**Microscopy study:** <sup>3, 4</sup> For microscopic evaluation, free hand sections of the fresh sample were taken and washed with chloral hydrate solution. Sections were first observed in distilled water, later stained with phloroglucinol and conc. HCl. Pow-

der of drug was mixed with chloral hydrate solution and made warm. With this solution slides were prepared and observed for lignified elements.

**Physico-chemical analysis:** <sup>4</sup> Physico-chemical constants such as consistency and organoleptic characters and the percentage of totalash, acid-insoluble ash, water-soluble ash and extractive values and loss on drying (LOD) were calculated as per the Indian Pharmacopoeia.

**Preparation of extracts:** The Aqueous-Methanol and the Chloroform extracts of the drug Mandukaparni(*Centella asiatica*) and Brahmi(*Bacopa monnieri*) was prepared at 'GREEN CHEM', Herbal extracts and formulations, Domlur, 2nd Stage, 3rd Phase, Bangalore-71.

**Analytical study:** <sup>5</sup> Preliminary phyto-chemical investigations are carried out by following standard procedure

**Table: 1 organoleptic evaluation of *Cetella asiatica* and *Bacopa monnieri***

Features	Mandukaparni( <i>Centella asiatica</i> )	Brahmi( <i>Bacopa monnieri</i> )
Colour	Greyish green	Bright green
Shape	Leaves : Reniform with crenate margins	Leaves: sessile, succulent, opposite, obovate-oblong
Taste	Slightly Bitter	Bitter
Surface	Rough	Smooth
Odour	Slightly aromatic	Characteristic

Features	Brahmi ( <i>Centella asiatica</i> )	<b>Brahmi</b>
Touch	Rough	Rough
Colour	Greyish green	Greenish brown
Odour	Pleasant	Characteristic
Taste	Bitter	Bitter

**Table No: 2 macroscopic evaluation of Powder of *Cetella asiatica* and *Bacopa monnieri***

<b>Brahmi (<i>Centella asiatica</i>)</b>	<b>Brahmi (<i>Bacopa monnieri</i>)</b>
Presence of Vessels with spiral, reticulate and annular thickening.	Presence of Single layer of upper and lower epidermis covered with cuticle.
Presence of Rosette crystals of calcium oxalate	Presence of Glandular trichomes
Presence of Simple, oval to round starch grains measuring 8-16µ in diameter.	Presence of Prismatic crystals of calcium oxalate

Presence of Epidermal cells polygonal in surface view with stomata, palisade cells.	No distinct midrib present.
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**Table No: 3 Microscopic evaluations of the *Cetella asiatica* and *Bacopa monnieri***

**Table: No: 4 physicochemical tests of *Centella asiatica* and *Bacopa monnieri*:**

Physico-chemical tests	Brahmi ( <i>Centella asiatica</i> )	Brahmi ( <i>Bacopa monnieri</i> )
Foreign matter	Not more than 2%	Not more than 2%
Loss on drying	7.64% w/w	12.54% w/w
Total ash	9.20 % w/w	12.685 % w/w
Acid insoluble ash	2.49 % w/w	1.3% w/w
Water soluble extractive value	19.38 %	22.704%
Alcohol soluble extractive value	23.08%	27.344%
pH value	7.02	6.8

**Table No: 5 Phyto-chemical evaluation of *Cetella asiatica* and *Bacopa monnieri*:**

Constituents	Tests	Centella asiatica		Bacopa Monneiri	
		Aqueous-Methanol extract	Chloroform extract	Aqueous-Methanol extract	Chloroform extract
Alkaloids	Mayer's reagent	+	+	+	+
	Dragendroff's test	+	+	+	+
Glycosides	Molisch's test	+	-	-	-
Flavanoids	Alkaline test	+	+	+	-
	Ferric chloride test	+	-	-	-
Triterpenoids	Salkowski Test	+	-	+	-
	Lieberman Bruchards test	+	+	+	+
Saponins	Foam test	+	-	+	+
Tannins	Ferric chloride test	+	-	+	-
Steroids	Salkowski's test	+	+	+	-
Carbohydrates	Molisch's test	-	-	-	-
	Felhings test	+	+	-	-
	Benedicts test	+	+	-	+
Protein	Millons test	+	+	-	+
Starch		+	-	+	-
Resin				+	+

**Table No 6: Phyto-chemical evaluation of the drugs for Inorganic compounds in *Cetella asiatica* and *Bacopa monnieri*:**

Tests	Brahmi( <i>Centella asiatica</i> )	Brahmi ( <i>Bacopa monnieri</i> )
Calcium	+	+
Magnesium	+	+
Sodium	-	+
Potasium	-	-
Iron	+	-
Sulphate	+	+
Chloride	+	+
Nitrates	+	-

## DISCUSSION

- Foreign matter are well within normal limits, which further accounts for the careful collection of the sample. As sample was collected by self no impurities were found with the sample.
- Moisture content: Moisture content of Brahmi is more compared to Mandukaparni. As the leaf of *Bacopa monnieri* is succulent moisture content is relatively more. Care must be taken while drying this drug, improper drying may lead to deterioration of the drug by microbial infestation.
- Ash values are helpful in determining the quality and purity of crude drugs in powdered form. The total ash usually consists of inorganic radicals like carbonates, phosphates, silicates and silica of sodium, potassium, magnesium and calcium. Such variables are then removed by treating with acid (as they are soluble in hydrochloric acid) and then acid-insoluble ash value is determined. Values of both the drugs are were within normal limits. As sample was completely devoid of admixture and physical impurities so ash value was within normal limits.
- Extractive values: These values are useful for evaluation of crude drugs and give an idea about the nature of soluble phytoconstituents. Alcohol soluble Extractive values of both Brahmi and Mandukaparni are more than water soluble extractive values

which suggests the presence of more alcohol soluble compounds.

- Phytochemical study: Phytochemical study reports are suggest more no.of constituents in aqueous methanol extract compared to the chloroform extract suggesting the solubility of the phytoconstituents.

## CONCLUSION

Brahmi is an important medicinal plant indicated in the ancient literature of traditional Indian medicine. This plant is having potential medicinal values and this review more emphasizes on the phytochemical investigations, which can be investigated further to achieve lead molecules in the search of novel herbal drugs.

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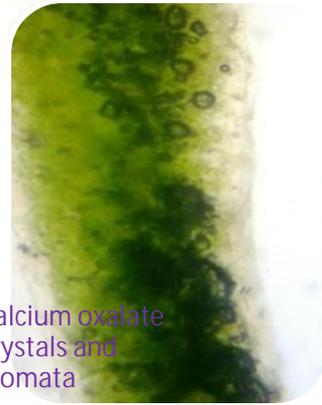
**Transverse section of Leaf of *Centella asiatica***



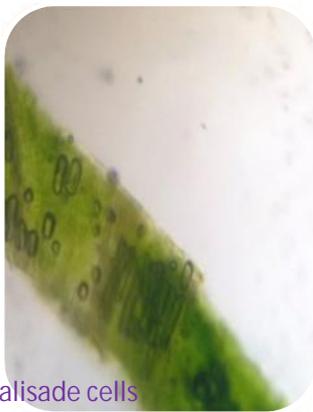
Macroscopy



leaf mid rib with vascular bundles



Calcium oxalate crystals and stomata



Palisade cells



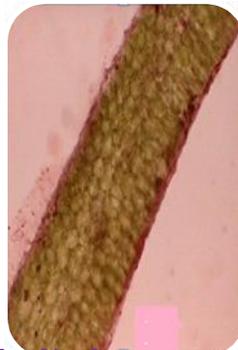
Petiole showing arrangement of vascular bundles



Upper epidermis with trichome and lower epidermis with stomata



Macroscopy



Ts of leaf



TS of Leaf showing epidermis



Vascular bundle



Stomata



Trichome

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