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### Quality Evaluation of Important Ayurvedic Raw Drug Brahmi (*Bacopa monnieri*)

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**Abstract:** *Bacopa monnieri* (L.) Pennell, commonly known as brahmi from the family Plantaginaceae is a well known memory enhancer widely used in the indigenous systems of medicine. The whole plant is medicinally useful and used as a brain tonic which rejuvenates memory and mind. Bacoside saponins are the major active ingredients in brahmi. Increasing demand leads to adulteration/substitution. In this context, an attempt has been made to assess the extent of adulteration in traded samples of *Bacopa monnieri* in different forms available in Kerala market by checking the presence of marker compound bacoside A in them using High Performance Thin Layer Chromatography (HPTLC) technique. The study revealed that out of thirty fresh market samples analysed, all were genuine samples with presence of bacoside A, of course in varying levels. Out of five packeted brahmi powders purchased from Kerala market, only one contained bacoside A. Granular processed formulations collected from the market claiming Brahmi as the ingredient when tested revealed very low levels of bacoside A compared to fresh samples. Mimicking weeds like *Lindernia* species were found in the freshly marketed samples.

**Key words:** Adulteration, Brahmi, *Bacopa monnieri*, Bacoside A

#### INTRODUCTION

*Bacopa monnieri* (L.) Pennell, is a perennial trailing herb which belongs to the family Plantaginaceae. This medicinal plant famous as brahmi in Hindi and Malayalam is a very effective memory booster and

brain tonic used in Ayurveda. It is effective in the treatment of epilepsy, asthma, ulcers, tumors, enlarged spleen, inflammations, leprosy, anemia and gastroenteritis. The whole plant is medicinal containing saponin bacosides as major active

ingredients. These bacoside saponin can be taken as marker compound for authentication of true brahmi samples. Brahmi is the major essential ingredient in many ayurvedic formulations like Brahmeeegritham, Brahmi oil and Saraswatharishtam [1]-[3]. The increasing demand for herbal medicines along with less availability of genuine plant materials has led to widespread adulteration in herbal drug industry. In this context, an attempt has been made to assess the quality of market samples of brahmi available in raw drug market in different forms as fresh herb, packed dry powder and as processed granules.

## MATERIALS AND METHODS

Thirty numbers of fresh brahmi samples were collected from various herbal raw drug markets of Kerala, shade dried and powdered. Genuine samples of brahmi were collected from the plants grown in Viswanathan Memorial Herbal Garden of Kerala Agricultural University, Vellanikkara, Thrissur campus, authenticated by botanists, dried and fine powdered. This is taken as reference sample. Five brahmi samples traded in the market as dry packeted powders and five processed granular brahmi formulations were also collected from herbal drug market for quality study. Table 1. Shows the details of samples taken for study. Hot methanol extracts were prepared (10% w/v) with these samples by soxhelt extraction method. Samples were subjected to bacoside A estimation by HPTLC analysis using Silica Gel 60<sub>F</sub> 254 as solid phase and a mixture of Dichloromethane: methanol: Water (Ratio 4.5: 1 : 0.1) as mobile phase. Scanning was done under UV-225 nm. Standard bacoside A purchased from Natural Remedies private Ltd., Benagaluru was cochromatographed along with the samples. The procedure followed for Bacoside estimation was as described by Om Prakash *et al* in 2008 [4].

## RESULT AND DISCUSSION

**Fresh Brahmi samples from market :** All thirty fresh brahmi samples were of true type and can very

**Table 1**  
**Details of fresh brahmi samples studied**

<i>Sl No</i>	<i>Details of samples taken for study</i>	<i>Number of samples</i>
1	Fresh brahmi samples collected from different raw drug markets of Kerala	30
2	Brahmi samples traded in the raw drug market as dry powders (packed)	5
3	Processed formulations as brahmi rich granules purchased from market which claim to enhance memory	2
4	As reference sample : Fresh Brahmi cultivated in KAU herbal garden	1
Total number of samples analysed		38

easily be identified morphologically. No adulteration/substitution was found when sold as fresh in the raw drug market. But the market availability was less because of storage problem. Mimicking weeds like *Lindernia sps* and grasses are often found in fresh samples, as an unintentional addition at the time of collection.

Chemical analysis showed that all fresh samples of raw drug brahmi collected contained the active ingredient bacoside A in varying amounts ranging from 0.90 to 2.55 mg/g (Table 2). The fresh sample collected from Thrissur market showed highest content of Bacoside A (2.55 mg/g). Variation in bacoside A content observed could be due to environmental and edaphic factors [5]-[6].

**Brahmi samples traded as packed dry powder:** Brahmi powder as such is rarely sold in Kerala markets. It is not possible to visually assess the genuineness of brahmi samples when sold as dry powders in market. But when chemically analysed for the presence of active ingredient bacoside A, four samples out of five gave negative results. This may be due to substitution of Brahmi with powders other than brahmi [7]. The sample No: 4 showed presence of Bacoside A (2.4 mg/g) (Table 3).

**Processed granular formulations of brahmi:** Two different samples of processed granular formulations of brahmi collected from market when analysed gave very small quantity of bacoside A. (Table 4). This may be either due to less quantity of brahmi used as ingredient or due to loss of bacoside during processing [7].

From the study it can be concluded that it is better to use fresh brahmi samples than granules and powders as far as possible, which will definitely contain the active ingredient Bacoside A.

**Table 2**  
**Bacoside content of fresh brahmi market samples**

Sr. No.	Fresh brahmi samples from market-source of collection	Bacoside A content (mg/g)	Assessment from external morphology & Bacoside A presence
1	Wadakanchery	1.20	True type
2	Ernakulam	1.45	True type
3	Ernakulam	1.50	True type
4	Kodakara	1.20	True type
5	Chalakyady	2.52	True type
6	Chalakyady	2.10	True type
7	Muvatupuzha	1.90	True type
8	Muvatupuzha	1.85	True type
9	Muvatupuzha	1.95	True type
10	Ottapalam	1.85	True type
11	Thrissur	2.15	True type
12	Thrissur	2.55	True type
13	Kunnamkulam	2.05	True type
14	Kunnamkulam	2.12	True type
15	Ankamaly	1.40	True type
16	Ankamaly	2.10	True type
17	Kasargod	2.10	True type
18	Waynad	2.40	True type
19	Kozhikode	2.50	True type
20	Kozhikode	1.65	True type
21	Vadakara	2.25	True type
22	Thalassery	2.35	True type

contd. table 2

Sr. No.	Fresh brahmi samples from market-source of collection	Bacoside A content (mg/g)	Assessment from external morphology & Bacoside A presence
23	Kannur	2.50	True type
24	Kannur	1.25	True type
25	Kollam	<b>0.90</b>	True type
26	Kollam	0.92	True type
27	Trivandrum Vazhuthakad	1.55	True type
28	Trivandrum Karamana	1.70	True type
29	Trivandrum Palayam	1.45	True type
30	Irinjalakuda	1.85	True type
31	Reference sample- cultivated brahmi from KAU herbal garden	2.53	True type
	CD(0.05)	0.218	
	CV %	5.656	

**Table 3**  
**Bacoside content of market samples traded as brahmi powders**

Market available brahmi powders	Bacoside A content (mg/g)
Sample 1	Not detected
Sample 2	Not detected
Sample 3	Not detected
Sample 4	2.4
Sample 5	Not detected
Reference sample- cultivated brahmi from KAU herbal garden	2.53

**Table 4**  
**Bacoside content of market samples traded as brahmi granules**

Brahmi granules from market	Bacoside A content (mg/g)
Sample 1	0.20
Sample 2	1.90
Reference sample- cultivated brahmi from KAU herbal garden	2.53

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