



# Formulation and Evaluation of Brahmi Syrup

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## Abstract:

Neurodegenerative disorders such as Alzheimer's disease and memory impairment are increasing worldwide and have become a major health concern. Herbal medicines are widely accepted because of their therapeutic effectiveness, low toxicity, and minimal side effects. Bacopa monnieri, commonly known as Brahmi, is an important medicinal plant used in Ayurveda as a memory enhancer, nervine tonic, and cognitive booster. The plant contains active phytoconstituents such as bacosides, alkaloids, flavonoids, and saponins that exhibit neuroprotective and antioxidant activities.

The present research work was aimed at formulation and evaluation of herbal syrup containing Bacopa monnieri extract for cognitive enhancement. The aqueous extract of Brahmi was prepared by decoction method and incorporated into syrup base containing sucrose syrup, glycerin, sodium benzoate, citric acid, and purified water. The prepared syrup was evaluated for organoleptic characteristics, pH, viscosity, specific gravity, and stability studies.

The prepared formulation showed acceptable physical appearance with brown colour, characteristic odour, pleasant sweet taste, and good pourability. The pH of syrup was found within suitable range for oral administration. Stability studies indicated that the formulation remained stable without precipitation or microbial growth during storage. The study concluded that the formulated Brahmi syrup possesses satisfactory pharmaceutical properties and may serve as a potential herbal preparation for improvement of memory and cognitive function.

**Keywords:** Bacopa monnieri, Brahmi syrup, Herbal formulation, Cognitive enhancer, Alzheimer's disease, Herbal medicine.

## 1. INTRODUCTION

Herbal medicines have been used since ancient times for prevention and treatment of diseases. According to the World Health Organization (WHO), a major proportion of the population in developing countries depends upon herbal medicines for primary healthcare needs. Herbal formulations are gaining popularity because they are considered safe, economical, and effective compared to synthetic drugs.

Among various herbal dosage forms, syrups are one of the most preferred oral formulations due to their pleasant taste, ease of swallowing, and better patient compliance. Syrups are concentrated aqueous solutions containing sugar or sugar substitutes with or without medicinal substances. Herbal syrups are widely used for pediatric and geriatric patients because they are easy to administer.

Alzheimer's disease is a progressive neurodegenerative disorder characterized by loss of memory, cognitive dysfunction, confusion, and behavioral disturbances. Oxidative stress and neuronal degeneration are major factors responsible for development of cognitive disorders. Although several synthetic drugs are available for management of Alzheimer's disease, long-term use may produce adverse effects such as nausea, insomnia, dizziness, and gastrointestinal disturbances. Therefore, researchers are focusing on herbal medicines possessing neuroprotective activity.

Bacopa monnieri is a small creeping herb belonging to family Plantaginaceae. It is commonly known as Brahmi and is widely distributed throughout India in wet and marshy areas. In Ayurveda, Brahmi is considered as "Medhya Rasayana," which means a rejuvenator for brain and nervous system. The plant is traditionally used for enhancement of memory, learning capacity, concentration, and intelligence.

The major active constituents present in *Bacopa monnieri* are bacoside A and bacoside B. These compounds possess antioxidant, anti-inflammatory, neuroprotective, anxiolytic, and cognitive enhancing activities. Studies have shown that *Bacopa monnieri* improves synaptic communication, protects neurons from oxidative damage, and enhances cerebral blood circulation.

The present study focuses on development of herbal syrup containing *Bacopa monnieri* extract and evaluation of its pharmaceutical properties to establish its suitability as an oral herbal formulation.



## 2. REVIEW OF LITERATURE

Several researchers have carried out studies on *Bacopa monnieri* and herbal syrup formulations for cognitive enhancement.

A study published in Indian Journal of Pharmaceutical Sciences evaluated marketed Brahmi formulations and reported the presence of important phytoconstituents such as bacosides and flavonoids responsible for neuroprotective activity. The study concluded that *Bacopa monnieri* formulations possess significant antioxidant properties useful in treatment of neurological disorders.

Another research study conducted on herbal memory enhancer syrups demonstrated successful formulation and evaluation of polyherbal syrups containing Brahmi extract. The formulations showed acceptable pH, viscosity, and stability suitable for oral administration.

Research on phytochemical screening of *Bacopa monnieri* extract revealed presence of alkaloids, glycosides, flavonoids, tannins, and saponins. These phytoconstituents contribute to antioxidant and anti-inflammatory activity.

Various pharmacological studies have shown that *Bacopa monnieri* improves cognitive performance, learning ability, and memory retention in experimental models. Neuroprotective activity of Brahmi is mainly attributed to bacosides that help in repair of damaged neurons and enhancement of neurotransmission.

Literature studies indicate that herbal syrups are advantageous dosage forms because they provide ease of administration, better palatability, and improved patient compliance. Therefore, formulation of Brahmi syrup may be useful as an alternative herbal preparation for cognitive disorders.



### 3. AIM OF WORK

To formulate and evaluate herbal syrup containing aqueous extract of *Bacopa monnieri* for cognitive enhancement and memory improvement.

### 4. OBJECTIVES

1. To prepare aqueous extract of *Bacopa monnieri*.
2. To formulate herbal syrup using suitable pharmaceutical excipients.
3. To evaluate organoleptic and physicochemical properties of syrup.
4. To determine stability of formulation during storage.
5. To develop a stable and patient-friendly herbal dosage form.

### 5. PLAN OF WORK

1. Collection and authentication of *Bacopa monnieri* plant material.
2. Drying and powdering of plant material.
3. Preparation of aqueous extract by decoction method.
4. Preparation of syrup base.
5. Incorporation of Brahmi extract into syrup.
6. Evaluation of prepared formulation.
7. Stability studies.
8. Compilation of results and conclusion.

## 6. MATERIALS AND METHODS

<b>FORMULATION CHART OF BRAHMI SYRUP (50 mL) – 3 BATCHES</b>				
INGREDIENTS	BATCH F1 (Low Concentration)	BATCH F2 (Medium Concentration)	BATCH F3 (High Concentration)	ROLE
	Quantity for 50 mL	Quantity for 50 mL	Quantity for 50 mL	
Bacopa monnieri Extract (Brahmi Extract)	125 mg	250 mg	375 mg	Active ingredient
Sucrose Syrup	30 mL	30 mL	30 mL	Sweetening agent
Sorbitol Solution (70%)	5 mL	5 mL	5 mL	Sweetener & viscosity enhancer
Glycerin	3 mL	3 mL	3 mL	Viscosity enhancer
Sodium Benzoate	0.05 g	0.05 g	0.05 g	Preservative
Citric Acid	0.02 g	0.02 g	0.02 g	pH adjuster
Flavour (Orange/Pineapple)	q.s.	q.s.	q.s.	Palatability
Colour	q.s.	q.s.	q.s.	Appearance
Purified Water	q.s. to 50 mL	q.s. to 50 mL	q.s. to 50 mL	Vehicle

## 7. METHOD OF PREPARATION

### *Preparation of Aqueous Extract*

Fresh Bacopa monnieri plant material was collected, washed thoroughly with water, and dried under shade. The dried material was powdered using grinder. About 10 g of powder was boiled with distilled water for 30 minutes to obtain aqueous extract. The extract was filtered using muslin cloth followed by filter paper to remove impurities. The filtrate obtained was concentrated by heating.

### *Preparation of Syrup*

Sucrose syrup was prepared by dissolving sugar in purified water with gentle heating. Glycerin was added as viscosity enhancer. Sodium benzoate was dissolved separately and added as preservative. The prepared aqueous extract of Brahmi was slowly incorporated into syrup base with continuous stirring. Citric acid was added to improve flavour and maintain pH. Finally, the volume was adjusted with purified water and syrup was filled into amber-colored bottles.

## 8. EVALUATION TESTS

### *8.1 Organoleptic Evaluation*

The prepared syrup was evaluated visually for colour, odour, taste, and appearance.

Observation



Colour: Brown  
Odour: Characteristic  
Taste: Sweet  
Appearance: Smooth and uniform

### **8.2 Determination of pH**

The pH of syrup was determined using calibrated digital pH meter at room temperature.

Result

The pH of formulation was found to be 5.6 which is suitable for oral administration.

### **8.3 Viscosity Determination**

Viscosity was measured using Brookfield viscometer.

Result The syrup showed optimum viscosity indicating good pourability and consistency.

### **8.4 Specific Gravity**

Specific gravity was determined using pycnometer method.

Result

Specific gravity was found to be 1.20.

### **8.5 Stability Study**

The syrup was stored at room temperature for stability analysis. Samples were observed periodically for changes in colour, odour, precipitation, and pH.

Observation

No significant change was observed during storage period.

## **9. RESULTS AND DISCUSSION**

The prepared Bacopa monnieri syrup showed satisfactory pharmaceutical properties. Organoleptic evaluation indicated that the syrup possessed pleasant sweet taste and characteristic odour acceptable for oral administration. Brown colour of formulation was due to presence of herbal extract.

The pH of syrup was within acceptable range which indicates compatibility with oral mucosa and minimizes irritation. Addition of glycerin improved viscosity and consistency of formulation. Sodium benzoate effectively prevented microbial contamination during storage.

Stability studies demonstrated that formulation remained physically stable without precipitation or phase separation. No significant variation in pH or appearance was observed during storage.

The results suggest that the prepared Brahmi syrup can serve as a stable and effective herbal formulation for cognitive enhancement and memory improvement.

## **10. CONCLUSION**

The present research work successfully formulated and evaluated herbal syrup containing Bacopa monnieri extract. The formulation showed acceptable organoleptic properties, optimum viscosity, suitable pH, and good stability characteristics. The syrup remained stable during storage without microbial growth or precipitation.

Bacopa monnieri possesses neuroprotective and antioxidant properties that may be beneficial in management of cognitive disorders such as Alzheimer's disease and memory impairment. Therefore, the formulated herbal syrup may serve as a promising natural preparation for enhancement of memory and cognitive function.

Further pharmacological and clinical studies are required to evaluate therapeutic efficacy and long-term safety of the formulation.



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