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"Formulation and Evaluation of Chewable Tablet of Brahmi"

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A B S T R A C T :

This study focuses on the formulation and evaluation of chewable tablets containing Brahmi (Bacopa monnieri), a herb traditionally used for enhancing memory and cognitive function. Brahmi's neuroprotective and adaptogenic properties make it suitable for pediatric, geriatric, and general use. The tablets were prepared using the wet granulation method and evaluated based on preformulation studies, organoleptic properties, hardness, friability, and chewability. Five different formulations were developed with varying ratios of excipients such as mannitol, microcrystalline cellulose, stevia, and starch paste. Among all, formulation F5 showed optimal physical characteristics and patient acceptability. The study demonstrates the feasibility of creating a palatable and effective chewable dosage form using herbal ingredients, supporting its potential use in natural cognitive health solutions.

Keywords: Brahmi, Chewable Tablet, Cognitive Enhancer, Herbal Formulation

1.Introduction

Brahmi (Bacopa monnieri) is a well-established herb in Ayurveda, recognized for its ability to improve memory, concentration, and overall cognitive performance. It acts as a natural nootropic with antioxidant and neuroprotective effects, making it suitable for long-term mental wellness. Chewable tablets have gained popularity as a convenient and palatable dosage form, particularly among pediatric and geriatric patients who face difficulty swallowing conventional tablets. However, the bitter taste of herbal extracts like Brahmi often limits their acceptability in such formulations. This study focuses on the development and evaluation of Brahmi chewable tablets using suitable excipients to enhance taste, improve patient compliance, and ensure therapeutic effectiveness. The goal is to create a standardized herbal formulation that is easy to consume, stable, and clinically effective.

1.1. Chewable tablets

- Chewable tablets are a convenient and widely accepted oral solid dosage form intended to be chewed and swallowed without the need for water. They are especially useful for pediatric and geriatric patients, as well as individuals who have difficulty swallowing traditional tablets or capsules. Their palatability, ease of administration, and rapid disintegration in the mouth make them a patient-friendly option in both therapeutic and preventive healthcare.
- These tablets typically include active pharmaceutical ingredients along with sweeteners, flavoring agents, binders, and other excipients to improve taste and texture. Modern formulation techniques allow for taste masking of bitter herbal extracts, thereby increasing patient compliance without compromising therapeutic efficacy.
- Chewable tablets also offer faster onset of action due to partial pre-digestion in the oral cavity, and they can be formulated for various indications, including vitamins, supplements, antacids, and herbal remedies.
- In the context of this study, Brahmi was selected as the active herbal component due to its cognitive-enhancing properties. The chewable tablet form provides a practical delivery system for Brahmi, offering better palatability, convenience, and consistent dosing. This makes it suitable for regular use in promoting mental clarity, focus, and overall cognitive health.

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1.2 Ideal characteristics of Chewable Tablet:

- Non-irritant to the oral cavity.
- Pleasant taste and mouthfeel.
- Easy to chew.
- No bitter aftertaste.
- Stable formulation with a long shelf-life.

2. Excipient Profile

List of excipients:

Sr.No	Excipient	Roll of Ingredients	Supplier
1	Brahmi Extract	Active ingredient (API)	Full moon Global
2	Mannitol	Sweetener and filler	CDH Laboratory
3	Microcrystalline Cellulose (MCC)	Binder and filler	Astron Chemicals
4	Starch Paste	Binder	Oxford Laboratory
5	Stevia	Natural sweetener	Zydus Wellness
6	Talc	Glidant	Chemdyes Corporation
7	Magnesium Stearate	Lubricant	CDH Laboratory

2.1 Brahmi Extract

- Acts as the main active pharmaceutical ingredient (API).
- Known for cognitive-enhancing, antioxidant, and neuroprotective properties.
- Helps improve memory, focus, and learning.
- Supports nervous system function and reduces mental fatigue.
- Widely used in Ayurvedic formulations for brain health.

2.2 Mannitol

- Serves as a sweetener and filler in chewable tablets.
- Provides a cooling sensation and improves mouthfeel.
- Masks the bitter taste of Brahmi, increasing palatability.
- Enhances texture and flow properties during granulation.
- Improves moisture resistance and physical stability.

2.3 Microcrystalline Cellulose (MCC)

- Used as a binder and filler.
- Enhances compressibility and tablet hardness.
- Maintains uniform shape and mechanical strength.
- Contributes to consistent disintegration and stability.
- Helps prevent tablet breakage or crumbling.

2.4 Starch Paste

- Acts as a natural binder in wet granulation.
- Ensures cohesive granule formation.
- Prevents segregation of ingredients.
- Improves chewability and texture.
- Minimizes powder formation during chewing.

2.5 Stevia

- A natural, plant-based sweetener.
- Masks bitterness of the herbal extract effectively.
- Works with mannitol to provide a pleasant taste.
- Safe for pediatric and diabetic patients.
- Enhances overall patient compliance.

2.2.6 Talc

- Functions as a glidant.
- Improves powder flow during compression.
- Prevents sticking of granules to machine parts.
- Enhances tablet smoothness and shape consistency.
- Reduces friction and improves production efficiency.

2.7 Magnesium Stearate

- Used as a lubricant in tablet manufacturing.
- Prevents sticking to punches and dies.
- Aids in smooth ejection of tablets from the mold.
- Maintains uniform tablet size and thickness.
- Supports consistent compression and tablet integrity.

3. Formulation and Development:-

3.1 Procedure for preparation of Brahmi chewable tablet by wet granulation method.

Take and weigh Brahmi Extract, Mannitol, and MCC and mix them in a mortar and pestle.

↓

Now add the binder solution of starch paste to form a damp mass of powder mixture.

↓

The damp mass is passed through sieve no. 8 or 10 to form wet granules.

↓

These granules are dried in a tray dryer at 60°C.

↓

The dried granules are then passed through sieve no. 20 to obtain uniform-sized granules.

↓

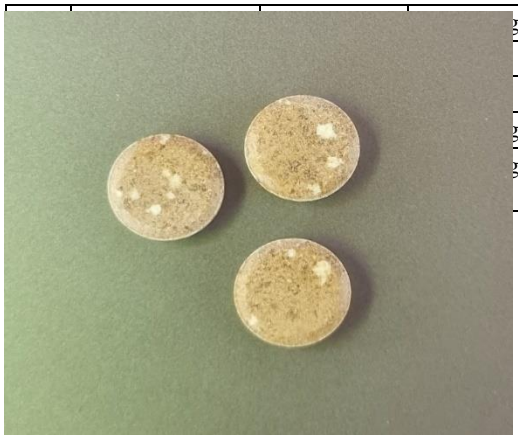
Talc and Magnesium Stearate are then added to the dried granules and mixed thoroughly.

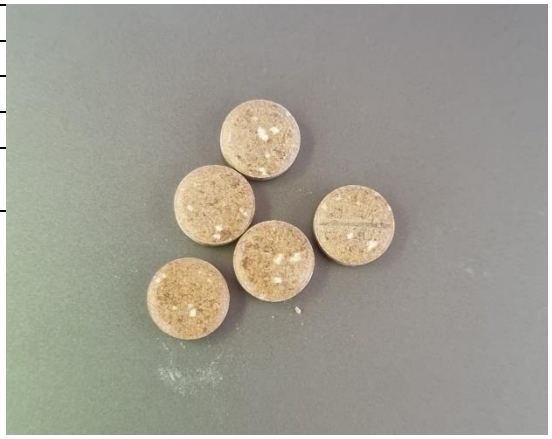
↓

The mixed granules are compressed in a single punch fitted with appropriate punches and dies.

4. Composition of Herb-vita Dark Chewable tablets of Brahmi:-

No.	Ingredients	F1	F2	F3	F4	F5
1	Brahmi extract	125mg	125mg	125mg	125mg	125mg
2	Mannitol	90mg	75mg	70mg	60mg	55mg





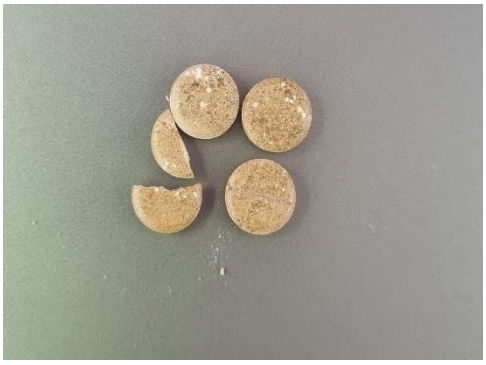


Figure .1 Formulation – 1 **Figure 4.2 Formulation – 2**

Figure 4.3 Formulation - 3 **Figure 4.4 Formulation - 4**

Figure 4.5 Formulation - 5

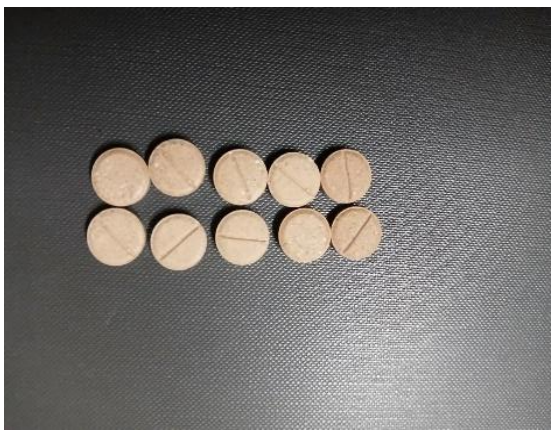
5.Evaluation of Chewable Tablets

The prepared Brahmi chewable tablets were evaluated for the following parameters to assess their physical, mechanical, and organoleptic properties.

5.1 Hardness

Tablet hardness was measured using a Monsanto hardness tester. It determines the mechanical strength of the tablet during handling and packaging. The acceptable range was found to be between 3–5 kg/cm².

5.2 Friability



Friability test was performed using a Roche friabilator. A fixed number of tablets were rotated at 25 rpm for 4 minutes. Tablets were weighed before

and after the test to calculate the percentage loss. Friability below 1% was considered acceptable.

5.3 Weight Variation

Twenty tablets were randomly selected and individually weighed. The average weight and standard deviation were calculated. The formulation passed the weight variation test as per IP specifications.

5.4 Disintegration Time

The disintegration time was determined in distilled water at 37 ± 2°C using a disintegration apparatus. Chewable tablets should disintegrate within 15 minutes. All formulations were found to disintegrate within acceptable limits.

5.5 Taste and Mouthfeel

Taste masking and mouthfeel were evaluated by a panel of volunteers. F5 showed excellent palatability with no gritty texture and satisfactory taste masking, making it suitable for pediatric and geriatric use.

5.6 Appearance and Shape

All the tablets were visually inspected for color, shape, and surface texture. The final formulation was smooth, round, and uniform in appearance with no visual defects.

Sr no	Evaluation	F1	F2	F3	F4	F5
1	Colour	Light Brown	Light Brown	Brown	Brown	Brown
2	Taste	Very sweet	Very sweet	Sweet	Moderately sweet	Moderately sweet
3	Average Weight	250mg	250mg	250mg	250mg	250mg
4	Thickness	2mm	2mm	2mm	2mm	2mm
5	Hardness	7.4kg/cm2	7.5kg/cm2	6.4kg/cm2	6.8kg/cm2	6.7kg/cm2
6	Friability	<1%	<1%	<1%	<1%	<1%
7	Chewability	Not easily chewable	Not easily chewable	Easily chewable	Easily chewable	Easily chewable

Result Table

Characterization	Result
Bulk density	0.38g/ml
Tapped density	0.45g/ml
Hausner's ratio	1.18
Carr's index	15.56
Angle of repose	34.96
Colour	Brown
Taste	Moderately Sweet
Average weight	250mg
Thickness	2 mm
Hardness	6.7kg/cm2
Friability	<1%
Chewability	Easily Chewable

Conclusion

- The present study successfully formulated and evaluated chewable tablets of Brahmi (Bacopa monnieri) using the wet granulation method. A total of five different formulations (F1 to F5) were prepared by varying the concentrations of mannitol and microcrystalline cellulose.
- Among all, formulation F5 showed optimal physical characteristics, including acceptable hardness, low friability, faster disintegration, and excellent taste masking. The formulation demonstrated good patient acceptability and compliance, especially for pediatric and geriatric populations.
- The study concludes that Brahmi can be effectively delivered through chewable tablets, offering a convenient and palatable herbal dosage form. This approach combines traditional herbal knowledge with modern pharmaceutical technology to create a stable, easy-to-administer, and functionally effective product for cognitive enhancement.
- Future studies may focus on scale-up, in vivo evaluation, and long-term stability testing of the optimized formulation.

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