FORMULATION AND EVALUATION OF IMMUNITY BOOSTING POLYHERBAL CHEWABLE TABLET

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ABSTRACT

An immunity-boosting chewable tablet containing amla (Emblica officinalis), ashwagandha, tulsi, turmeric, and ginger was developed to improve palatability and patient compliance. Different formulations were prepared using suitable binders, sweeteners, and flavoring agents by varying excipient concentrations.
The tablets were evaluated for hardness, friability, weight variation, disintegration time, taste, and overall acceptability. The optimized formulation showed good mechanical strength, rapid disintegration, and acceptable taste, making it a promising natural immunity-boosting supplement.

Key words – Amla, chewable tablet, immunity booster, herbal formulation, antioxidant

INTRODUCTION

Chewable tablets are a convenient and patient-friendly dosage form designed to improve compliance, especially among pediatric and geriatric patients who have difficulty swallowing conventional tablets and capsules. They can be administered without water, possess pleasant taste and texture, and provide improved palatability through the use of sweetening and flavoring agents. In addition, chewable tablets enhance drug dissolution and absorption, making them more acceptable and effective for patients. Their ease of administration and portability further increase patient adherence to therapy.

Herbal formulations have gained significant importance because of their natural origin, therapeutic effectiveness, and lower risk of side effects. Amla (Emblica officinalis) is widely recognized for its high vitamin C content and antioxidant properties that help strengthen the immune system. Other herbs such as Ashwagandha, Tulsi, Turmeric, and Ginger also possess immunomodulatory, anti-inflammatory, antimicrobial, and antioxidant activities. The combination of these herbs in a polyherbal formulation provides synergistic effects that support immunity and overall health.

Compared to liquid and semi-solid formulations, chewable tablets offer several pharmaceutical advantages including better chemical and microbial stability, accurate dosing, ease of handling, and longer shelf life. They also reduce the risk of leakage and contamination while eliminating the need for special storage conditions. The formulation of polyherbal chewable tablets using suitable binders, diluents, and flavoring agents helps achieve acceptable hardness, low friability, and good palatability.

2. MATERIALS AND METHODS

The raw material like drugs, excipients, and chemicals required for the present work was procured from different sources. Following materials were used for the formulation and evaluation of polyherbal chewable tablet.

1) Amla powder

Fig no. 1 Amla powder

Amla powder is commonly used in chewable tablets because it is rich in vitamin C and antioxidants that support immunity and digestion. It gives a natural sour taste and is often combined with sweeteners like mannitol or sorbitol to improve taste. Fine, low-moisture amla powder is preferred for better tablet compression and stability. In chewable tablets, it acts as both a nutritional and herbal active ingredient. Proper packaging is important because amla powder is sensitive to moisture.

2) Tulsi powder

Fig no. 2 Tulsi powder

Tulsi powder is used in chewable tablets for its antioxidant, immunity-boosting, and respiratory health benefits. It has antimicrobial and stress-relieving properties, making it popular in herbal and nutraceutical

formulations. Tulsi powder is usually blended with sweeteners and flavors to reduce its strong herbal taste. Fine, dry powder is preferred to ensure good tablet compression and stability. Proper moisture-controlled packaging helps maintain the quality and shelf life of tulsi chewable tablets.

3) Ashwagandha powder

Fig no. 3 Ashwagandha powder

Ashwagandha powder is commonly used in chewable tablets for its stress-relieving, energy-boosting, and immunity-supporting properties. It is widely used in herbal and nutraceutical products to help improve stamina, strength, and overall wellness. The powder is usually mixed with sweeteners and flavors to mask its slightly bitter taste. Fine, low-moisture ashwagandha powder is preferred for better tablet compression and stability. Proper packaging is important to protect the tablets from moisture and maintain their quality.

4) Ginger powder

Fig no. 4 Ginger powder

Ginger powder is used in chewable tablets for its digestive, anti-inflammatory, and anti-nausea benefits. It helps relieve indigestion, motion sickness, and throat irritation, making it popular in herbal formulations. Ginger powder is often combined with sweeteners and flavors to balance its spicy taste. Fine, dry powder is preferred for smooth tablet compression and better stability. Moisture-resistant packaging is important to maintain the quality and shelf life of ginger chewable tablets.

5)Turmeric powder

Fig no. 5 Turmeric powder

Turmeric powder is used in chewable tablets for its antioxidant, anti-inflammatory, and immunity-supporting properties. It is commonly included in herbal and nutraceutical products to support joint health and overall wellness. Turmeric powder is usually blended with sweeteners and flavors to reduce its slightly bitter taste and improve palatability. Fine, low-moisture powder is preferred for better tablet compression and stability. Proper moisture-protective packaging helps maintain the quality and shelf life of turmeric chewable tablets.

Table no. 1 List of material

Sr. No.	Name of chemical	Herbal drug	Glasswares
1.	Methyl paraben	Amla	Roche Friabilator
2.	Sucrose	Tulsi	Beaker
3.	Talc	Ashwagandha	Morter and pestle
4,	Acacia	Ginger	Weighing balance
5.	Orange oil	Turmeric	Compression machine

PREPRATION METHOD FOR TABLET

1. Accuratetly weighing all ingredient. (Amla, Tulasi, Ashwagandha, Turmeric)

2. Sieving. (pass all ingredient (expect orange oil) through sieve no 60.)

3. Mixing of active ingredient and excipient. (mix throughly in a clean and dry container.)

4. Addition of flavouring agent. (add orange oil dropwise to powder blend.)

5. Lubrication. (add talc to mixture mix lightly to avoid affecting tablet hardness.)

6. Compression. (transfer the final blend to a tablet compression machine.)

7. Packaging. (pack tablet in blister packs or airtight container.)

Table no. 2 Formulation composition

Sr. No	Ingredient	Quantity (mg)
1.	Amla	200mg
2.	Tulasi	40mg
3.	Ashwagandha	40mg
4.	Ginger	20mg
5.	Turmeric	20mg
6.	Acacia	40mg
7.	Sucrose	110mg
8.	Orange oil	5mg
9.	Talc	20mg
10.	Methyl paraben	5mg

EXPERIMENTAL WORK

Preformulation studies for tablet

Angle of Repose (θ): Indicates flowability

- **Procedure**
  - Fix a funnel at a certain height (about 2–5 cm) above a flat surface.
  - Close the funnel opening and fill it with the powder sample.
  - Open the funnel and allow the powder to flow freely onto the surface.
  - Let the powder form a **conical heap** without disturbance.
  - Measure:

    Height (h) of the heap

    Radius (r) of the base

Table No.3 Acceptance criteria

Angle of repose (^{0})	Flow property
≤25	Excellent
25-30	Good
30-40	Passable
>40	Very poor

• **Bulk Density:** Mass per unit volume before tapping

❖ **Procedure**

• Weigh a known quantity of the powder (e.g., 10 g).

• Carefully transfer the powder into a clean, dry measuring cylinder without compacting it.

• Do not tap or shake the cylinder.

• Note the **initial volume (V_0)** occupied by the powder

•**Tapped Density:** After mechanical tapping

❖ **Procedure**

• Weigh an accurate quantity of powder (e.g., 10 g).

• Record the **initial volume (V_0)** (this is bulk volume).

• Place the cylinder on the tapped density apparatus.

• Tap the cylinder **100 times initially**.

• Record the new volume.

• Continue tapping (usually up to **500–1250 taps**) until the volume becomes constant.

• Note the **final tapped volume (Vt)**.

• **Carr's Index (% Compressibility):**

$$\text{Carr index } (\%) = \frac{\text{Tapped density} - \text{Poured density}}{\text{Tapped density}} \times 100$$

• **Hausner Ratio:**

$$Hausner\ \ Ratio = \left(\frac{\rho_{tapped}}{\rho_{bulk}} \right)$$

EVALUATION PARAMETER OF TABLET:

General Appearance

- Check color, shape, size, texture, and absence of defects.
- Tablets should be visually uniform and appealing.

Fig no.6 Polyherbal Tablet.

Hardness (Crushing Strength)

- Measured using a hardness tester
- Chewable tablets should be moderately hard (not too hard to chew, not too soft to break)

Friability Test

- Performed using a friabilator
- Indicates mechanical strength during handling and transport

Thickness and Diameter

- Measured using vernier calipers
- Ensures uniformity and proper packaging

Disintegration test

- Performed using a disintegration test apparatus
- Indicates the time required for the tablet to break down into smaller particles for drug release

RESULTS AND DISCUSSION

This study suggests that the polyherbal chewable tablet containing amla, ashwagandha, tulasi, turmeric, and ginger effectively enhances immune function due to its immunomodulatory and antioxidant properties. The tablets met all evaluation standards and showed promising potential as a natural and convenient immunity-boosting supplement.

Table no.6 flow properties of powder

SR.NO	PARAMETER	RESULT
1.	Angle of repose	25°
2.	Bulk density	0.50g/ml
3.	Tapped density	0.45g/ml
4.	Cars index	13%
5.	Hausners ratio	1.25

EVALUATION OF TABLET

1) Appearance: Light brown to yellowish color and found to be uniform in color, shape, and size. The tablets exhibited a smooth surface with a slightly matte finish

2) Texture: Smooth and slightly porous texture

3) pH: The pH of tablet is 5.6 by using pH paper.

4) Weight variation: Ten tablets are individually weighted and their average weight was calculated showing consistency.

Table no. 7 Evaluation parameter

SR.NO	PARAMETER	RESULT
1	Weight variation	500mg±5
2	Hardness	3.6 kg/cm2
3	Friability	(0.31%) (NMT 1.0%)
4	Thickness and daimeter	4-6mm
5	Disintegrtaion time	6 min

DISCUSSION:

The formulated polyherbal tablet exhibited a light brown to yellowish color appearance and characteristic odour. The average weight of the tablets was found to be 500 mg, and the measured tablet thickness was 5mm, falling within the ideal range. The hardness of the tablets was recorded as 3.6 kg/cm², which is within the recommended range of 2.5–5 kg/cm². Disintegration testing revealed that the tablets disintegrated within 6 to 7 min. Using a Roche friabilator, the friability test showed that the tablets had a friability of 0.31%, which lies within the acceptable range of 0.5–1.0%, after 4 minutes of rotation.

CONCLUSIONS:

A polyherbal chewable tablet containing amla, ashwagandha, tulasi, turmeric, and ginger was successfully formulated and evaluated. It showed acceptable physicochemical properties, good taste, chewability, stability, and uniformity. The formulation also demonstrated antioxidant, anti-inflammatory, immunomodulatory, and digestive benefits, indicating its potential as a convenient herbal supplement for improving overall health and immunity.

The tablets exhibited adequate hardness and low friability, ensuring good mechanical strength during handling and storage.

Weight variation and pH results were within acceptable limits, confirming formulation consistency.

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