

# FORMULATION AND EVALUATION OF HERBAL ANTACID CHOCOLATE FOR THE MANAGEMENT OF ACIDITY USING NATURAL INGREDIENTS

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## KEYWORDS

*Herbal Antacid Formulation;  
Hyperacidity;  
Glycyrrhiza glabra;  
Musa paradisiaca;  
Chocolate Drug Delivery  
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## Abstract

Hyperacidity is a common gastrointestinal disorder associated with excessive gastric acid secretion, causing symptoms such as heartburn, acid reflux, and indigestion. The present study aimed to formulate and evaluate a herbal antacid chocolate containing medicinal plant extracts with antacid and gastroprotective properties. The formulation was prepared using herbal extracts along with cocoa butter, cocoa powder, milk powder, and sugar. The prepared chocolate was evaluated for physicochemical properties, organoleptic characteristics, stability, and antacid activity. The formulation exhibited satisfactory physical characteristics, good stability, pleasant taste, and significant acid-neutralizing activity. The results indicate that herbal antacid chocolate may serve as a convenient, palatable, and effective alternative to conventional antacid preparations for the management of hyperacidity.

## INTRODUCTION

Hyperacidity is a common gastrointestinal disorder caused by excessive gastric acid secretion, resulting in symptoms such as heartburn, acid reflux, and indigestion. Factors such as unhealthy dietary habits, stress, smoking, alcohol consumption, and certain medications contribute to its occurrence. Conventional antacids provide quick relief but may cause adverse effects with prolonged use. Therefore, herbal

alternatives are gaining importance. Glycyrrhiza glabra (Licorice) and Musa paradisiaca (Raw Banana) possess gastroprotective, anti-ulcer, and antioxidant properties, making them promising natural remedies for the management of hyperacidity.

### Herbal Antacid Chocolate:

Herbal antacid chocolate is a medicated chocolate formulation designed to provide

relief from hyperacidity and gastric discomfort. It combines the therapeutic benefits of herbal ingredients with the palatability of chocolate, improving patient compliance and acceptability. It serves as a convenient and patient-friendly dosage form for the management of hyperacidity.

### The ideal characteristics of an Herbal Antacid Chocolate:

1. It should provide effective relief from hyperacidity and acid reflux.
2. It should possess good gastroprotective and antacid properties.
3. It should have a pleasant taste and acceptable mouthfeel.
4. It should effectively mask the unpleasant taste of herbal ingredients.
5. It should be easy to consume and improve patient compliance.
6. It should have a uniform appearance and texture.

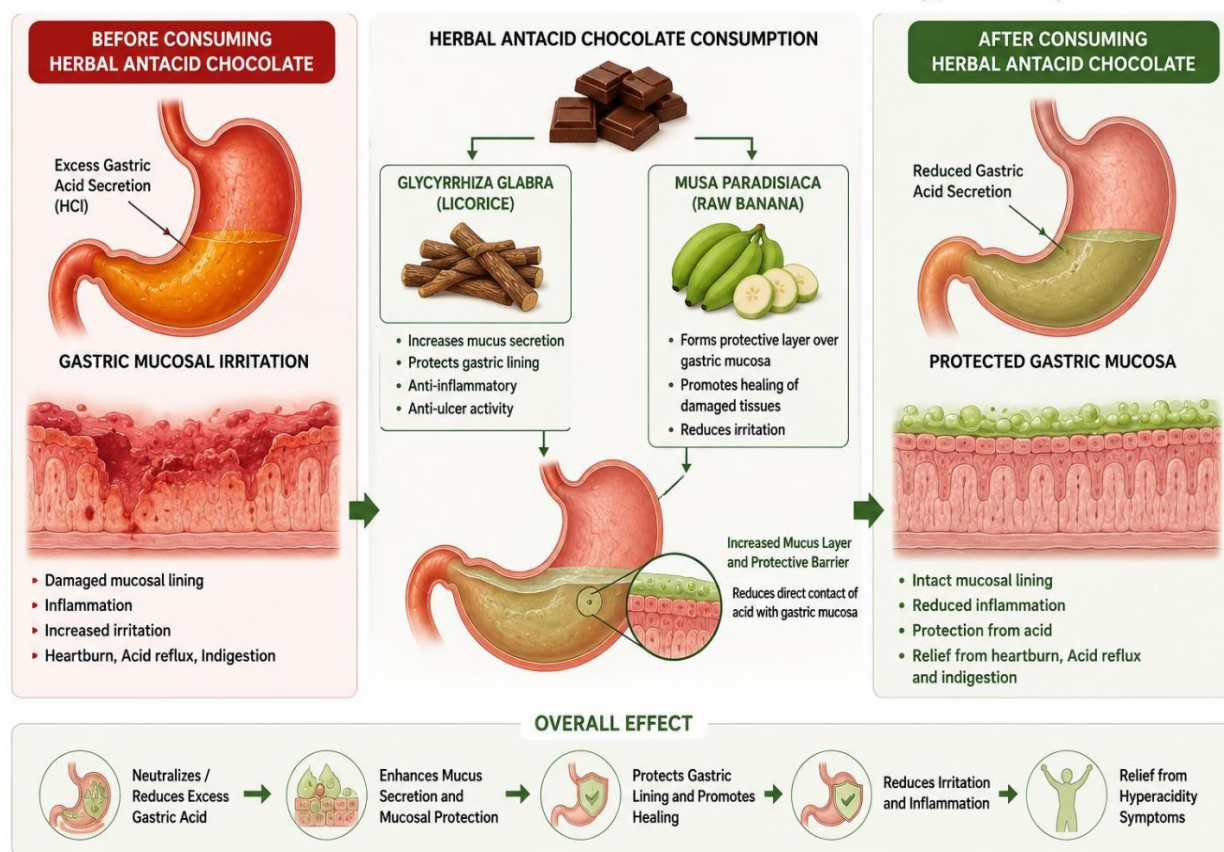


Figure No.1 – Mechanism of Acidity

### Advantages of Herbal Antacid Chocolate

1. Provides effective relief from hyperacidity, heartburn, and acid reflux.
2. Neutralizes excess gastric acid and reduces gastric discomfort.
3. Protects the gastric mucosa through gastroprotective activity.
4. Exhibits anti-inflammatory and anti-ulcer properties.
5. Improves digestion and reduces bloating.
6. Contains natural herbal ingredients with minimal side effects.

### MATERIAL AND METHODS

#### 1. *Glycyrrhiza glabra* L. (Licorice)

*Glycyrrhiza glabra* L. belongs to the family Fabaceae. Its roots contain glycyrrhizin and flavonoids, which possess anti-ulcer, anti-inflammatory, and gastroprotective properties. Licorice enhances mucus secretion, protects the

gastric mucosa, and helps reduce gastric irritation associated with hyperacidity. It also improves the palatability of the herbal

antacid chocolate due to its natural sweet taste.



**Figure No. 2 – Roots of *Glycyrrhiza Glabra L.***

## 2. *Musa paradisiaca* L.

*Musa paradisiaca* L. belongs to the family Musaceae. Unripe banana contains resistant starch, pectin, and antioxidants that possess antacid and gastroprotective properties. It helps protect the gastric

mucosa, reduces irritation, and provides relief from acidity, heartburn, and indigestion. Therefore, it is widely used in herbal antacid formulations.



**Figure No. 3 – *Musa paradisiaca* Linn**

## 3. Cocoa Butter

Cocoa butter is a natural fat obtained from the seeds of *Theobroma cacao* L. It is widely used as a chocolate base due to its smooth texture and excellent melting properties. In herbal antacid chocolate, it acts as a binding agent and carrier for herbal ingredients, ensuring uniform distribution of active constituents. It also improves the taste, stability, and overall acceptability of the formulation.

## 4. Dark Chocolate Compound

Dark chocolate compound is a mixture of cocoa solids, cocoa butter, and sugar used as the primary base in chocolate formulations. It provides structure,

stability, and uniform distribution of herbal ingredients in the formulation. It also improves taste, texture, and mouthfeel, thereby enhancing the acceptability of herbal antacid chocolate.

## 5. *Foeniculum vulgare* Mill

*Foeniculum vulgare* Mill. belongs to the family Apiaceae and is widely used as a medicinal and flavoring agent. It contains essential oils such as anethole and fenchone, which possess digestive and carminative properties. Fennel helps reduce gas, bloating, and gastric discomfort while supporting digestion and relieving acidity. It also improves the taste

and aroma of herbal antacid chocolate, enhancing its palatability.

#### 6. *Elettaria cardamomum* Maton

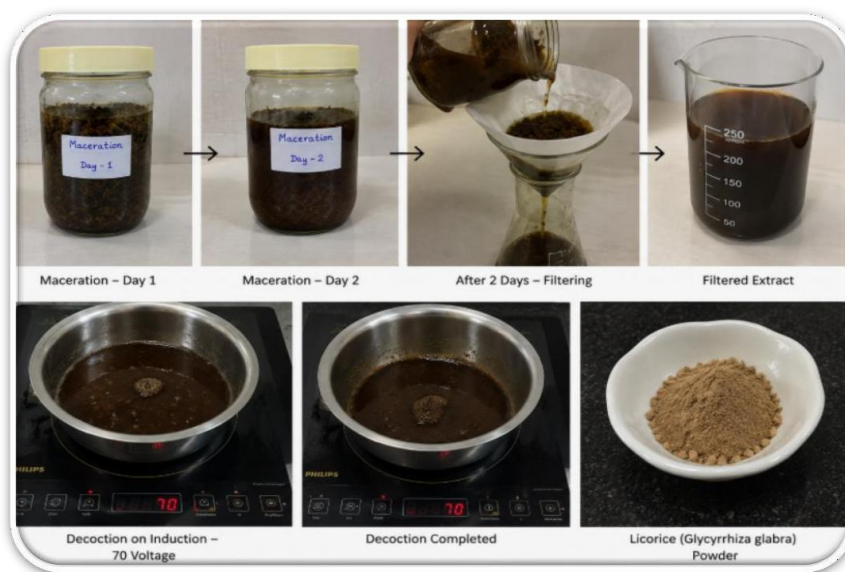
*Elettaria cardamomum* Maton belongs to the family Zingiberaceae and is widely used as an aromatic spice and medicinal plant. It contains essential oils such as 1,8-cineole and terpinyl acetate, which possess digestive, antimicrobial, and antioxidant properties. In herbal antacid chocolate, cardamom helps improve digestion, relieves gastric discomfort, and enhances the flavor and aroma of the formulation.

#### PREPARATION OF *GLYCYRRHIZA GLABRA* L. ROOTS EXTRACT

1. About 150 g of

coarsely powdered  
*Glycyrrhiza glabra*  
roots was mixed with  
750 ml distilled water.

2. The mixture was heated gently for 1–2 hours with continuous stirring.
3. After cooling, it was kept for 24 hours for complete extraction.
4. The extract was filtered through muslin cloth and Whatman filter paper.
5. The filtrate was concentrated on a water bath, dried to obtain powder, and stored in an airtight container.



**Figure No. 4 – *Glycyrrhiza Glabra* L. Roots**

#### extract PREPARATION OF HERBAL CHOCOLATE FORMULATION

1. Required quantity of chocolate and cocoa butter were accurately weighed, cut into small pieces and melted using double boiling method with continuous stirring
2. After complete melting of the chocolate base, accurately weighed quantities of Licorice extract, raw banana powder and cardamom powder were added slowly and mixed properly to obtain a uniform

mixture.

3. Further, required quantity of fennel oil was added and the formulation was stirred continuously for proper mixing of all ingredients.
4. The prepared chocolate formulation was poured into moulds and kept in refrigerator for solidification. After 15–20 minutes, the chocolates were removed carefully from the moulds and stored in airtight containers for further evaluation.



Figure No. 5 - Formulated Chocolate

## • FORMULATION TABLE

Table No.1- Formulation Table

| Sr. No | Ingredients                 | Batch 1 | Batch 2 | Batch 3 | Batch 4 | Batch 5 |
|--------|-----------------------------|---------|---------|---------|---------|---------|
| 1      | Dark Chocolate              | 13.5g   | 13g     | 15 g    | 15.18 g | 15 g    |
| 2      | Glycyrrhiza glabra Powder   | 2g      | 2 g     | 2 g     | 2 g     | 2g      |
| 3      | Musa paradisiaca Powder     | 2.4 g   | 4 .2g   | 2 g     | 2 g     | 2 g     |
| 4      | Elettaria cardamomum Powder | 0.4 g   | 0.4 g   | 0.8g    | 0.4 g   | 0.8 g   |
| 5      | Cocoa Butter                | -       | 0.4 g   | 0.3 g   | 0.3 g   | 0.3 g   |
| 6      | Fennel Oil                  | 1.9 g   | 0.06 gm | 0.06gm  | 0.12g   | 0.06gm  |
| 7      | Total Weight                | 20 g    | 20 g    | 20 g    | 20 g    | 20 g    |

## • EVALUATION PARAMETERS TEST FOR CHOCOLATE

### 1. Physical Evaluation

Physical parameters such as colour, odor, taste, shape and texture were checked visually.

#### • Colour:

The colour of chocolate formulations was checked by visual inspection.

#### • Taste and Palatability:

The taste of chocolate formulations was checked for sweetness and acceptable

herbal flavour.

#### • Shape and Appearance:

The shape and appearance of chocolate formulations were observed visually for uniformity and smooth surface.

#### • Texture:

The texture of chocolate formulations was checked manually for hardness and smoothness.

#### • Odor:

The odor of chocolate formulations was checked directly by smelling the chocolates.

## 2. Hardness Test

The hardness of chocolate formulations was determined manually by observing the resistance to breakage and cracking.

## 3. pH Determination

The pH of chocolate formulations was determined by using digital pH meter. About 1 gm of chocolate was dissolved in 10 ml distilled water and kept aside for two hours.

## 4. Melting Test

The melting behavior of chocolate formulations was checked at room temperature and body temperature to evaluate stability

and mouth feel characteristics.

## 5. Acid Neutralizing Capacity

The acid neutralizing capacity of chocolate formulations was determined by reacting the formulation with a known quantity of hydrochloric acid and measuring the amount of acid neutralized by the formulation.

## 6. Stability Study

Stability studies were carried out using open and closed container conditions. The prepared herbal antacid chocolate formulations were stored at room temperature for a period of 1 month. During the study period, the formulations were evaluated for parameters such as colour, odor, appearance, texture and melting behavior.

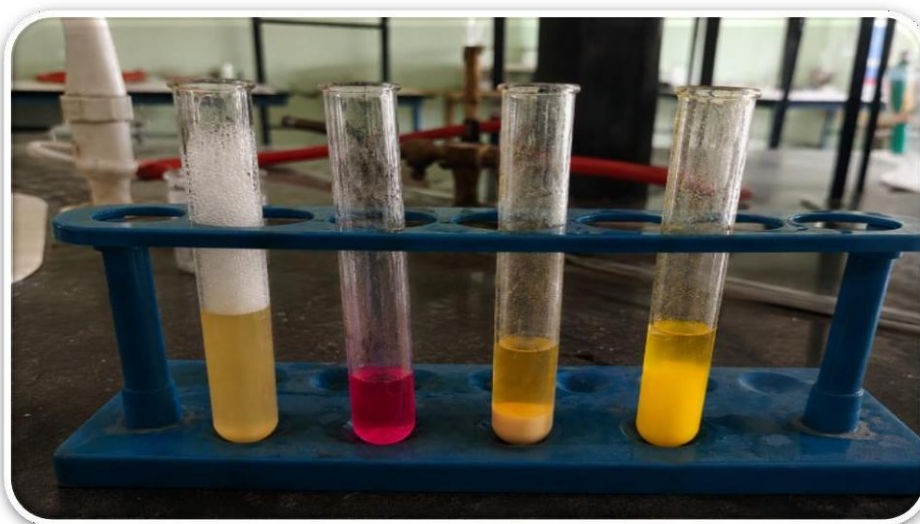
## RESULT AND DISCUSSION

- Identification test for *Glycyrrhiza glabra* L

Table No.4 - Identification test for *Glycyrrhiza glabra* L

| Sr. No. | Test for | Test         | Observations                        | Inference             |
|---------|----------|--------------|-------------------------------------|-----------------------|
| 1)      | Saponins | A] Foam Test | Stable persistent foam was observed | Saponins were present |
|         |          | B] Potassium | Yellow colour precipitate was       | Saponins were         |

|    |                   |                             |                                        |                         |
|----|-------------------|-----------------------------|----------------------------------------|-------------------------|
|    |                   | <b>Dichromate Test</b>      | <b>observed</b>                        | present                 |
| 2) | <b>Flavonoids</b> | <b>A] Shinoda Test</b>      | <b>Pink to red colour was observed</b> | Flavonoids were present |
|    |                   | <b>B] Lead Acetate Test</b> | Yellow colour precipitate was observed | Flavonoids were present |



**Figure No. 6. Identification Test for Licorice**

## Evaluation Parameters of chocolate

### 1. Physical evaluation Test

**Table No.2 - Physical Evaluation test**

| Sr. No. | Evaluation Parameter   | Observation                                             | Result     |
|---------|------------------------|---------------------------------------------------------|------------|
| 1)      | Colour                 | Dark brown colour was observed                          | Acceptable |
| 2)      | Taste and Palatability | Sweet taste with acceptable herbal flavour was observed | Acceptable |
| 3)      | Shape and Appearance   | Uniform shape with smooth surface was observed          | Acceptable |
| 4)      | Texture                | Smooth texture with suitable hardness was observed      | Acceptable |
| 5)      | Odor                   | Pleasant chocolate odor was observed                    | Acceptable |

### 2. Hardness Test Result:

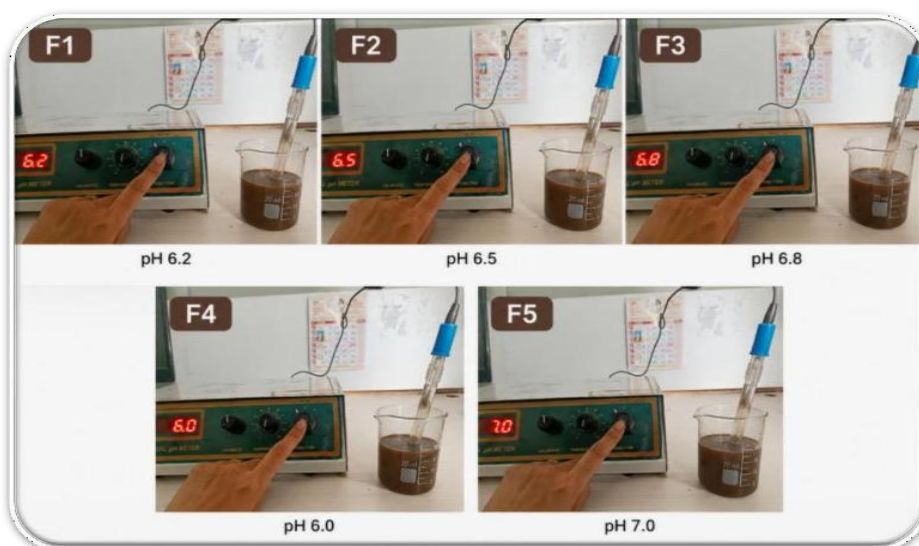
The prepared chocolate formulations showed good hardness with adequate resistance to breakage and cracking. All formulations were found to be smooth, firm acceptable in texture.



**Figure No .6- Hardness Test**

**Table No 3. pH Determination Test**

| Sr. No. | Formulation Batch | pH Value |
|---------|-------------------|----------|
| 1       | F1                | 6.2      |
| 2       | F2                | 6.5      |
| 3       | F3                | 6.8      |
| 4       | <b>F4</b>         | 6.0      |
| 5       | F5                | 7.0      |



**Figure No .7 - pH Determination Test**

#### 4. Melting Test

The melting test was performed to check the melting behavior of the prepared herbal antacid chocolate formulations. Small quantities of each batch were heated slightly and the melting nature was observed.

**Table No.4 – Melting Test**

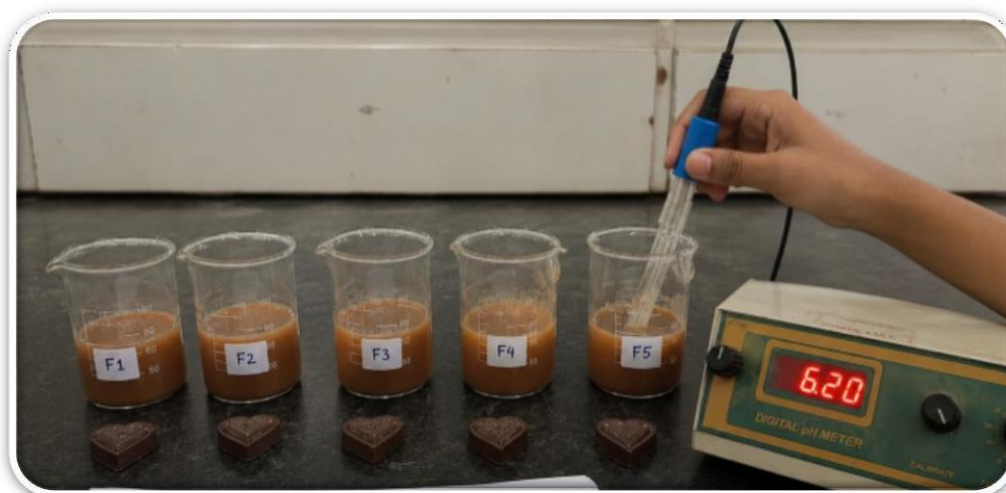
| Sr. No. | Batch | Test Condition   | Observation    |
|---------|-------|------------------|----------------|
| 1       | F1    | Room temperature | Smooth melting |

|   |           |                                          |                      |
|---|-----------|------------------------------------------|----------------------|
| 2 | F2        | Room temperature                         | Smooth melting       |
| 3 | F3        | Body temperature condition (37°C)        | Uniform melting      |
| 4 | <b>F4</b> | <b>Body temperature condition (37°C)</b> | Soft and melted fast |
| 5 | F5        | Body temperature condition (37°C)        | Smooth melting       |

### Acid Neutralizing Capacity

**Table No.5 - Acid Neutralizing Capaci**

| Sr. No. | Formulation | Initial pH | Final pH after Neutralization | Observation              |
|---------|-------------|------------|-------------------------------|--------------------------|
| 1       | F1          | 2.0        | 4.8                           | Moderate neutralization  |
| 2       | F2          | 2.0        | 5.3                           | Good neutralization      |
| 3       | F3          | 2.0        | 5.8                           | Better neutralization    |
| 4       | <b>F4</b>   | <b>2.0</b> | <b>6.2</b>                    | Excellent neutralization |
| 5       | F5          | 2.0        | 6.8                           | Maximum neutralization   |



**Figure No. 7 – Acid Neutralizing Test**

### CONCLUSION

The present study successfully developed and evaluated an herbal antacid chocolate containing *Glycyrrhiza glabra*, *Musa paradisiaca*, fennel oil, and cardamom powder. All formulations showed satisfactory physicochemical properties, good stability, and acceptable organoleptic characteristics. Phytochemical screening confirmed the presence of important bioactive constituents. Among all formulations, batch F5 exhibited the best acid-neutralizing capacity and overall performance. The study concludes that herbal antacid chocolate is a safe, effective, palatable, and patient-friendly alternative to conventional antacid formulations for the management of acidity and gastric discomfort. Further studies are

recommended to evaluate its clinical efficacy and long-term therapeutic potential.

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