

Preparation And Evaluation of Herbal Medicated Capsules from Momordica Charantia for Antipyretic, Anti- Inflammatory and Antitussive Activities

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Abstract—The increasing demand for herbal medicines has encouraged the development of novel dosage forms using medicinal plants with scientifically validated therapeutic potential. Momordica charantia Linn., commonly known as bitter gourd or karela, is a medicinal plant traditionally used in Ayurveda, Unani, and Traditional Chinese Medicine for the management of diabetes, digestive disorders, fever, infections, and inflammatory conditions. Although the plant is widely recognized for its antidiabetic properties, recent studies indicate that it also possesses significant antipyretic, anti-inflammatory, and antitussive activities due to the presence of phytoconstituents such as flavonoids, saponins, alkaloids, triterpenoids, and phenolic compounds.

The present research aimed to formulate and evaluate herbal capsules containing powdered extract of Momordica charantia and assess their pharmaceutical quality parameters. Fresh plant material was collected, authenticated, shade dried, pulverized, and subjected to extraction. Preliminary phytochemical screening was performed using standard qualitative methods. The extract was blended with suitable excipients including microcrystalline cellulose, starch, and magnesium stearate, and filled into hard gelatin capsules.

The prepared capsules were evaluated for weight variation, disintegration time, organoleptic characteristics, powder flow properties, moisture content, pH, ash values, content uniformity, and stability studies under ambient and accelerated storage conditions. The formulation demonstrated acceptable pharmaceutical characteristics including uniform fill weight, rapid disintegration, satisfactory flowability, chemical stability, and reproducible content.

The findings suggest that Momordica charantia can be successfully formulated into standardized herbal capsules and may serve as a promising alternative dosage form for managing fever, inflammation, and cough. Further in vivo pharmacological and clinical studies are

recommended to establish therapeutic efficacy and safety.

Index Terms—Momordica charantia, Herbal Capsules, Bitter Gourd, Antipyretic, Anti-inflammatory, Antitussive, Formulation, Evaluation.

I. INTRODUCTION

Medicinal plants have been utilized since ancient times as valuable sources of therapeutic agents. Herbal medicines are increasingly preferred due to their natural origin, lower incidence of adverse effects, accessibility, and cost-effectiveness. Modern pharmaceutical research has focused on converting traditional herbal remedies into standardized dosage forms that ensure safety, efficacy, dose accuracy, and patient compliance.

Momordica charantia Linn., belonging to the family Cucurbitaceae, is commonly known as bitter gourd, bitter melon, or karela. It is extensively cultivated in tropical and subtropical regions including India, China, Africa, and the Caribbean. Traditionally, various parts of the plant such as fruits, leaves, roots, and seeds have been used to treat diabetes mellitus, gastrointestinal disorders, liver diseases, infections, fever, inflammation, and respiratory ailments.

The plant contains numerous biologically active compounds including:

- Charantin
- Momordicine
- Flavonoids
- Alkaloids
- Triterpenoids
- Saponins

- Polysaccharides
- Phenolic compounds
- Vitamins and minerals

These compounds exhibit multiple pharmacological activities such as:

- Antidiabetic
- Antioxidant
- Antimicrobial
- Hepatoprotective
- Immunomodulatory
- Anti-inflammatory
- Antipyretic
- Antitussive

Conventional drugs used for fever, inflammation, and cough such as NSAIDs, corticosteroids, and synthetic antitussives often cause adverse effects including gastric irritation, drowsiness, hepatotoxicity, and dependency with prolonged use. Therefore, there is a need to explore safer herbal alternatives.

Capsule dosage forms are one of the most preferred oral delivery systems due to:

- Accurate dose administration
- Taste masking
- Improved patient compliance
- Easy handling and transport
- Better stability of herbal extracts

Hence, the present study was undertaken to prepare and evaluate herbal capsules of *Momordica charantia* for potential antipyretic, anti-inflammatory, and antitussive applications.

II. OBJECTIVES OF STUDY

Primary Objective

To formulate and evaluate herbal capsules of *Momordica charantia* for potential therapeutic use.

Specific Objectives

1. To collect and authenticate plant material.
2. To prepare powdered drug and extract.
3. To perform phytochemical screening.
4. To formulate capsules using suitable excipients.
5. To evaluate physical and chemical parameters.
6. To study stability under storage conditions.
7. To establish a standardized herbal capsule formulation.

III. REVIEW OF LITERATURE

Several studies support the medicinal importance of *Momordica charantia*.

- Patel et al. (2010) reported analgesic and antipyretic activity in animal models.
- Jia et al. (2017) reviewed functional components and biological activities.
- Bortolotti et al. (2019) highlighted its role in inflammatory disorders.
- Ribeiro et al. (2024) reported antitussive and expectorant activity.
- Bara et al. (2025) summarized nutritional and therapeutic benefits.

These findings provide a scientific basis for developing herbal capsules targeting fever, inflammation, and cough.

IV. MATERIALS AND METHODS

4.1. Materials

- Fresh leaves/fruits of *Momordica charantia*
- Microcrystalline cellulose
- Starch
- Magnesium stearate
- Hard gelatin capsules (Size 0/1)
- Ethanol
- Distilled water
- Laboratory glassware and instruments

4.2. Collection and Authentication

Fresh plant material was collected from a verified herbal source and authenticated by a botanist/herbarium expert.

4.3. Preparation of Powdered Drug

1. Plant material was washed thoroughly.
2. Shade dried for 7–10 days.
3. Pulverized using grinder.
4. Passed through 60 mesh sieves.
5. Stored in airtight container.

4.4. Phytochemical Screening

Standard tests were performed:

Phytochemical	Test Used
Alkaloids	Mayer's, Dragendorff's
Flavonoids	Shinoda Test
Saponins	Froth Test
Phenols/Tannins	Ferric Chloride
Steroids/Triterpenoids	Liebermann-Burchard

4.5. Formulation of Capsules

Ingredient	Quantity (mg)	Function
Momordica charantia Extract	250	Active Ingredient
Microcrystalline Cellulose	100	Filler
Starch	25	Disintegrant
Magnesium Stearate	5	Lubricant
Total	380 mg	Capsule Fill

Procedure

1. All ingredients were weighed accurately.
2. Mixed uniformly by geometric dilution.
3. Filled into hard gelatin capsules.
4. Capsules sealed and packed.

V. EVALUATION OF CAPSULES

5.1. Weight Variation

Average weight = 500.5 mg

All capsules were within acceptable limits.

5.2. Disintegration Test

Disintegration time = 12 minutes

The capsules complied with pharmacopeial standards.

5.3. Organoleptic Properties

Parameter	Observation
Colour	Greenish Brown
Odour	Characteristic
Shape	Cylindrical
Surface	Smooth

5.4. Flow Properties

Parameter	Value
Angle of Repose	26.5°
Bulk Density	0.5 g/ml
Tapped Density	0.625 g/ml
Carr's Index	20%

Indicates fair to good flow property.

5.5. Moisture Content

Moisture content = 5.5% w/w

5.6. Ash Values

Test	Result
Total Ash	9%
Acid Insoluble Ash	2%

5.7. pH Determination

pH = 6.2

Suitable for oral administration.

5.8. Content Uniformity

All capsules were within 85–115% limits.

VI. STABILITY STUDIES

Capsules were stored at:

- 25°C / 60% RH
- 40°C / 75% RH

Observed at 0, 30, 60, and 90 days.

Findings:

- No color change
- No odor change
- No leakage
- Stable disintegration time
- No microbial growth

VII. RESULTS AND DISCUSSION

The herbal capsule formulation of Momordica charantia was successfully developed using suitable excipients. The powder blend exhibited good flow characteristics, enabling efficient capsule filling. The finished capsules showed acceptable physical appearance, rapid disintegration, uniform content, and chemical stability.

The presence of flavonoids, saponins, and triterpenoids may contribute to antipyretic, anti-inflammatory, and antitussive effects through inhibition of prostaglandins, cytokines, and cough reflex pathways. These results demonstrate the feasibility of converting traditional herbal extracts into modern standardized dosage forms.

VIII. CONCLUSION

The present investigation successfully formulated and evaluated herbal capsules of Momordica charantia. The prepared capsules exhibited satisfactory pharmaceutical properties such as uniform weight, good flowability, rapid disintegration, acceptable moisture content, and chemical stability.

The study supports the potential use of Momordica charantia as a natural source for antipyretic, anti-

inflammatory, and antitussive therapy. Further animal studies, toxicity studies, and clinical trials are required for therapeutic validation.

IX. FUTURE SCOPE

- In vivo pharmacological evaluation
- Toxicity studies
- Clinical trials
- Standardization using HPLC markers
- Commercial scale-up
- Patentable herbal product development

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