

# Formulation and Evaluation of Gulvel Ointment for the Treatment of Gout

Anuja. V. More<sup>1</sup>, Omkar. D. Pilane<sup>2</sup>, Chetan. A. Mane<sup>3</sup>, Kokare. S. N<sup>4</sup>

<sup>1,2,3</sup> Students, JBVP'S Vidya Niketan Collage of Pharmacy, Lakhewadi

<sup>4</sup> Assistant Professor, JBVP'S Vidya Niketan Collage of Pharmacy, Lakhewadi

**Abstract:** Gout is an inflammatory disorder caused by deposition of monosodium urate crystals in joints, leading to severe pain and swelling. Herbal medicines are gaining attention due to fewer side effects compared to synthetic drugs. Gulvel (*Tinospora cordifolia*) is a well-known Ayurvedic medicinal plant possessing anti-inflammatory, anti-arthritis, and analgesic properties. *Tinospora cordifolia* extract has been explored for topical application in the form of ointment. The present study focuses on the formulation and evaluation of Gulvel ointment using suitable bases and excipients. The prepared ointment was evaluated for physicochemical parameters, stability, and *in vitro* anti-inflammatory activity. Results indicated that the formulation is stable, non-irritant, and shows promising therapeutic potential in gout management.

Gout is a chronic inflammatory disorder caused by the deposition of monosodium urate crystals in joints and surrounding tissues due to elevated levels of uric acid in the blood (hyperuricemia). This condition is characterized by severe pain, swelling, redness, and restricted joint movement, significantly affecting the quality of life of patients. The prevalence of gout has increased globally due to changes in dietary habits, lifestyle, and metabolic disorders. Conventional treatment of gout mainly includes non-steroidal anti-inflammatory drugs (NSAIDs), corticosteroids, and urate-lowering agents such as allopurinol. Although these drugs are effective in managing symptoms, their long-term use is associated with various adverse effects including gastrointestinal irritation, renal complications, and hypersensitivity reactions. Hence, there is a growing interest in the use of herbal medicines, which are considered safer, cost-effective, and associated with fewer side effects.

Gulvel (*Tinospora cordifolia*), also known as Guduchi, is a widely used medicinal plant in Ayurveda. It possesses a variety of pharmacological properties such as anti-inflammatory, anti-arthritis, analgesic, antioxidant, and immunomodulatory activities. The presence of bioactive constituents like alkaloids, flavonoids, glycosides, and tannins contributes to its therapeutic potential. In recent years, topical drug delivery systems such as ointments have gained importance due to their ability to provide localized action, minimize systemic absorption, and improve patient compliance. Therefore, the present study focuses on the formulation and evaluation of a Gulvel-based ointment using suitable bases and excipients.

**Keywords:** Gulvel, *Tinospora cordifolia*, gout, ointment, anti-inflammatory, herbal formulation

## I. INTRODUCTION

Gout is a chronic metabolic disorder characterized by elevated levels of uric acid in the blood (hyperuricemia), leading to the deposition of monosodium urate crystals in joints and surrounding tissues. This crystal deposition triggers intense inflammatory responses, resulting in severe pain, swelling, redness, and stiffness, particularly in joints such as the big toe, ankle, and knee. If left untreated, gout can lead to joint damage and decreased quality of life.

The conventional management of gout includes the use of non-steroidal anti-inflammatory drugs (NSAIDs), corticosteroids, and urate-lowering agents such as allopurinol. While these drugs are effective in reducing symptoms and controlling uric acid levels, their prolonged use is often associated with adverse effects such as gastrointestinal



irritation, renal complications, and hypersensitivity reactions. These limitations have led to increasing interest in alternative therapies, especially herbal medicines, which are considered safer and suitable for long-term use.

In traditional systems of medicine like Ayurveda, several medicinal plants are used for the treatment of inflammatory and arthritic conditions. Among them, Gulvel, also known as Guduchi, scientifically called *Tinospora cordifolia*, holds significant importance. It belongs to the family Menispermaceae and is widely distributed in tropical regions of India. Gulvel is known for its diverse pharmacological properties, including anti-inflammatory, anti-arthritic, antioxidant, analgesic, and immunomodulatory activities. These therapeutic effects are mainly attributed to the presence of bioactive constituents such as alkaloids, glycosides, diterpenoids, steroids, and flavonoids.

Due to its strong anti-inflammatory and anti-arthritic potential, *Tinospora cordifolia* is considered a promising herbal candidate for the management of gout. It helps in reducing inflammation, relieving joint pain, and improving immune response, thereby addressing the key pathological features of the disease.

Topical drug delivery systems, such as ointments, are widely used for the treatment of localized conditions like joint inflammation. Ointments offer several advantages, including direct application to the affected site, rapid onset of action, reduced systemic side effects, and improved patient compliance. They also provide a protective layer on the skin and enhance drug penetration when formulated with suitable bases and excipients.

The formulation of an effective herbal ointment requires careful selection of ingredients, including the drug, base, and additives, to ensure desirable characteristics such as stability, homogeneity, spreadability, and appropriate viscosity. The fusion method is commonly used for ointment preparation, where the base components are melted and mixed with the active ingredients to obtain a uniform product. Evaluation of the formulated ointment is a critical step to ensure its quality, safety, and efficacy. Various physicochemical and pharmaceutical parameters are assessed, including physical appearance, pH, spreadability, viscosity, extrudability, drug content uniformity, in-vitro drug release, skin irritation, and stability studies. These tests help in determining the performance and reliability of the formulation.

Although extensive research has been conducted on the pharmacological properties of *Tinospora cordifolia*, limited studies are available on its formulation as a topical ointment specifically for gout treatment. Therefore, the present study focuses on the formulation and evaluation of Gulvel ointment to explore its potential as a safe, effective, and economical herbal alternative for the management of gout. This research not only aims to develop a stable and effective topical formulation but also contributes to the scientific validation of traditional medicinal plants and promotes their use in modern pharmaceutical applications.

Gout is a metabolic disorder characterized by hyperuricemia and deposition of urate crystals in joints, causing inflammation and pain. Conventional treatments include NSAIDs, corticosteroids, and urate-lowering agents, but these often produce adverse effects.

Herbal medicine offers safer alternatives. *Tinospora cordifolia* (Gulvel/Guduchi) is widely used in Ayurveda due to its:

Anti-inflammatory activity

Anti-arthritic effect

Immunomodulatory properties

Scientific studies confirm that *Tinospora cordifolia* exhibits significant anti-inflammatory and analgesic effects in experimental models and is traditionally used in arthritis and inflammatory.

**Topical delivery via ointment provides:**

Localized effect

Reduced systemic side effects

Better patient compliance

Gout is a metabolic disorder characterized by elevated levels of uric acid in the blood, a condition known as hyperuricemia. This leads to the formation and deposition of monosodium urate crystals in joints, tendons, and surrounding tissues. These crystal deposits trigger an inflammatory response, resulting in acute pain, swelling, redness,



and tenderness in the affected joints. The condition commonly affects joints such as the big toe, ankles, knees, and fingers.

Gout is often associated with factors such as high purine diet, obesity, excessive alcohol consumption, genetic predisposition, and impaired renal function. If left untreated, it may lead to chronic gouty arthritis, joint deformity, and kidney complications.

**Limitations of Conventional Therapy:**

The management of gout typically involves the use of:

Non-steroidal anti-inflammatory drugs (NSAIDs)

Corticosteroids

Urate-lowering agents (e.g., allopurinol)

Although these medications are effective in reducing inflammation and controlling uric acid levels, they are associated with several adverse effects:

NSAIDs may cause gastric irritation and ulcers

Corticosteroids may lead to hormonal imbalance and immunosuppression

Long-term use of urate-lowering drugs can result in hypersensitivity and kidney-related issues

Due to these limitations, there is a need for alternative therapies that are safer and suitable for long-term use.

**II. REVIEW OF LITERATURE**

**1. Title:** Indian Pharmacopoeia 2026.

**Journal:** Official government pharmacopoeia.

**Author:** Indian Pharmacopoeia commission.

The Indian Pharmacopoeia Commission under the Ministry of Health and Family Welfare, Government of India, is responsible for publishing the Indian Pharmacopoeia, which serves as the official compendium of drug standards in India. The pharmacopoeia provides detailed specifications for the identity, purity, and strength of pharmaceutical substances and dosage forms, ensuring the quality, safety, and efficacy of medicines available in the country.

Several studies highlight that the Indian Pharmacopoeia plays a crucial role in regulatory control and quality assurance of drugs. It includes monographs, analytical methods, and reference standards that guide pharmaceutical industries, testing laboratories, and regulatory authorities.

Research literature also indicates that the Commission continuously updates the pharmacopoeia by adding new drugs and revising existing standards to meet modern healthcare requirements and global harmonization.

Furthermore, the Indian Pharmacopoeia Commission supports the pharmaceutical sector by providing reference substances, training, and pharmacovigilance activities, contributing to improved drug safety and rational use of medicines.

**2. Title:** The Ayurvedic Pharmacopoeia of India.

**Journal:** Official Government Pharmacopoeia.

**Author:** Ministry Of AYUSH, Government of india

The Ayurvedic Pharmacopoeia of India (API) is an official publication of the Government of India that provides standardized guidelines for Ayurvedic drugs. It includes detailed monographs describing the quality, purity, and strength of medicinal substances, which are essential for ensuring the safety and efficacy of Ayurvedic formulations.

Literature shows that the API plays a significant role in the standardization and quality control of herbal medicines, helping manufacturers and regulatory authorities maintain consistency in raw materials and finished products. It is considered a legal document under the Drugs and Cosmetics Act, 1940, making compliance with its standards mandatory.



Further studies indicate that the pharmacopoeia is developed and updated under the guidance of national bodies like the Pharmacopoeia Commission for Indian Medicine & Homoeopathy, ensuring that Ayurvedic medicines meet modern scientific and regulatory requirements.

Additionally, the API contributes to the global acceptance of Ayurveda by providing scientifically validated standards and analytical methods for herbal drugs, supporting research and development in traditional medicine systems.

**3. Title:** Textbook of Pharmaceutics

**Journal:** Textbook (Academic Book), published by CBS Publishers & Distributors

**Author:** S. P. Vyas and R. K. Khar

The Textbook of Pharmaceutics by S. P. Vyas and R. K. Khar, published by CBS Publishers & Distributors, is a widely used reference in pharmaceutical sciences that provides comprehensive knowledge on the principles and practices of pharmaceutics. The book covers fundamental concepts such as dosage form design, drug formulation, excipients, and pharmaceutical calculations, which are essential for the development of safe and effective medicines.

Literature based on this textbook emphasizes the importance of preformulation studies, including drug-excipient compatibility, stability, and physicochemical properties, which influence the selection of suitable dosage forms. It also explains various pharmaceutical preparations such as solutions, suspensions, emulsions, creams, ointments, and tablets, along with their methods of preparation and evaluation.

The text further highlights modern pharmaceutical techniques and quality control measures, including evaluation parameters like viscosity, pH, spreadability, and stability testing. These concepts are crucial in ensuring the efficacy, safety, and stability of pharmaceutical products.

Additionally, the book discusses the role of pharmaceutics in industrial pharmacy, focusing on large-scale manufacturing, packaging, and regulatory requirements. It serves as a foundational source for students and researchers, supporting both academic learning and practical application in Formulation development.

**4. Title:** Advances in Herbal Drug Delivery Systems

**Journal:** International Journal of Pharmaceutical Sciences

**Author:** Alpesh Dalvi and Preeti Chauhan

Recent studies published in the International Journal of Pharmaceutical Sciences highlight significant progress in herbal drug delivery systems, focusing on improving the therapeutic effectiveness of plant-based medicines. Herbal drugs, although widely used due to their natural origin, low toxicity, and affordability, often face limitations such as poor solubility, low bioavailability, instability, and rapid metabolism.

To overcome these challenges, advanced techniques known as Novel Drug Delivery Systems (NDDS) have been developed. These include carrier-based systems such as liposomes, phytosomes, niosomes, microspheres, and microemulsions, which enhance drug stability, improve absorption, and provide controlled and targeted drug release.

Literature also suggests that these modern delivery approaches significantly improve the pharmacological activity and patient compliance of herbal formulations by reducing dosing frequency and minimizing side effects.

**5. Title:** The Wealth of India (A Dictionary of Indian Raw Materials and Industrial Products)

**Journal:** Council of Scientific and Industrial Research

**Author:** Reference Book / Encyclopedic Series

The Wealth of India (A Dictionary of Indian Raw Materials and Industrial Products), published by the Council of Scientific and Industrial Research, is a comprehensive multi-volume reference that documents India's natural resources, especially medicinal plants, minerals, and industrial raw materials. It provides detailed information on botanical description, geographical distribution, chemical constituents, and traditional uses of various plant species.



Literature based on this source highlights its importance in the identification and authentication of crude drugs, making it highly valuable for pharmaceutical and herbal research. It serves as a reliable reference for understanding the phytochemistry and therapeutic potential of medicinal plants used in traditional systems like Ayurveda.

The book also supports the development of herbal formulations by offering scientific data on active constituents, pharmacological properties, and industrial applications of natural materials. Researchers and industries widely use it for drug development, standardization, and quality control of herbal products.

Furthermore, it bridges traditional knowledge with modern science by compiling validated information, thus contributing to the research, conservation, and sustainable utilization of natural resources in India.

**6.Title:** WHO Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants

**Journal:** Official Guideline Document / Technical Report

**Author:** World Health Organization

The WHO Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants, developed by the World Health Organization, provide a comprehensive framework for ensuring the quality, safety, and consistency of medicinal plant materials used in herbal medicines. These guidelines emphasize proper practices in cultivation, harvesting, collection, and post-harvest processing, which are critical factors affecting the quality of herbal drugs.

Literature highlights that implementation of GACP helps in minimizing contamination, adulteration, and variability in medicinal plant materials. It ensures that raw materials are free from microbial load, pesticides, and heavy metals, thereby improving the safety profile of herbal products.

### III. AIM AND OBJECTIVE

**Aim:**

Formulation and evaluation of gulvel ointment for the treatment of gout

**Objectives:**

The objectives of the study are designed to achieve the above aim through systematic formulation and evaluation processes:

**1. To formulate a herbal ointment containing Gulvel extract**

To prepare a suitable ointment formulation by incorporating extract of *Tinospora cordifolia* into an appropriate base such as white soft paraffin, beeswax, and liquid paraffin or natural oils. The formulation should be smooth, homogeneous, and suitable for topical application.

**2. To select and optimize excipients**

To choose appropriate excipients such as emulsifying agents, stabilizers, and penetration enhancers (e.g., propylene glycol) that improve the physical characteristics, stability, and drug release profile of the ointment. Optimization ensures better therapeutic performance and patient acceptability.

**3. To evaluate physicochemical properties**

To assess important parameters including:

Color, odor, and appearance

Texture and homogeneity

pH (skin compatibility)

Consistency

These properties are essential for ensuring quality, stability, and acceptability of the formulation.

**4. To determine spreadability**

To evaluate the ease with which the ointment spreads on the skin surface. Good spreadability ensures uniform application and enhances patient compliance.



**5. To evaluate viscosity**

To measure the viscosity of the formulation using a viscometer. Proper viscosity ensures the ointment remains at the site of application and provides prolonged therapeutic action.

**6. To assess extrudability**

To determine the ease of extrusion of the ointment from the container or tube. This parameter is important for practical usage and patient convenience.

**7. To evaluate drug content uniformity**

To ensure uniform distribution of Gulvel extract throughout the ointment, which is necessary for consistent therapeutic effect in each dose.

**8. To perform in vitro drug release studies**

To study the rate and extent of drug release from the ointment using suitable diffusion methods. This helps in understanding the availability of active constituents at the site of action.

**9. To evaluate anti-inflammatory activity**

To assess the anti-inflammatory potential of the formulated ointment using appropriate in vitro or in vivo models. This confirms the effectiveness of the formulation in managing inflammation associated with gout.

**10. To assess skin irritation and safety**

To evaluate the formulation for any signs of skin irritation, redness, or allergic reactions. A safe formulation should be non-irritant and suitable for repeated application.

**11. To conduct stability studies**

To perform stability studies under different storage conditions (temperature and humidity) to determine the shelf life and ensure that the formulation maintains its physical and chemical properties over time.

**12. To compare with standard treatment (if applicable)**

To compare the effectiveness of the herbal ointment with conventional anti-gout treatments in terms of safety, efficacy, and patient compliance.

**IV. PLAN OF WORK**

**Selection of Topic**



**Literature Review**



**Collection of Gulvel Stem**



**Authentication of Plant Material**



**Drying and Powdering of Stem**



**Preparation of Herbal Extract  
(Maceration/Soxhlet Extraction)**



**Filtration and Concentration of Extract**

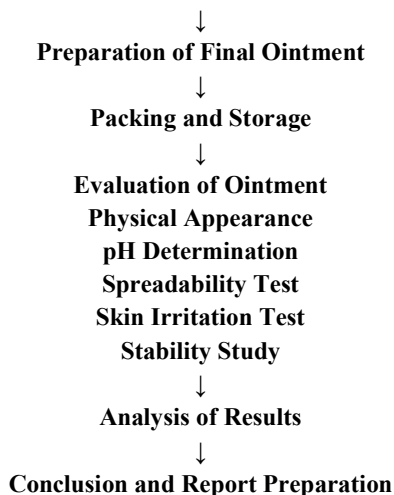


**Preparation of Ointment Base  
(Beeswax + Petroleum Jelly + Liquid Paraffin)**



**Incorporation of Gulvel Extract  
into Ointment Base**





#### **V. DRUG PROFILE:**

##### **Ingrident Used In Formulation :**

##### **1.Gulvel Plant**

**Scientific Name:** Tinospora cordifolia

**Family:** Menispermaceae

**Biological Source:** Gulvel is a widely distributed plant found in tropical regions of India, commonly growing in deciduous forests and over small trees and hedges. It is present up to an altitude of about 1200 meters, extending from Kumaon to Assam and across regions such as West Bengal, Bihar, Deccan, Konkan, Karnataka, and Kerala.



**Fig.1 Gulvel plant**

##### **Description and Uses:**

Gulvel is a climbing shrub with a fleshy, elongated stem and aerial roots arising from branches. The outer bark is thin, papery, and varies from brown to grey. Leaves are heart-shaped (cordate), and flowers are arranged in clusters. The stem powder appears creamish-brown with a characteristic bitter taste.

In Ayurveda, Gulvel has been used for centuries for the treatment of various diseases. It is known for its immunomodulatory, antioxidant, anti-inflammatory, antipyretic, and hepatoprotective properties. It is widely used in conditions such as fever, cough, liver disorders, and immune-related disease. Due to its ability to enhance immunity, it has gained importance in recent therapeutic research.



## 2. Curcuma longa Extract

**Scientific Name:** Curcuma longa

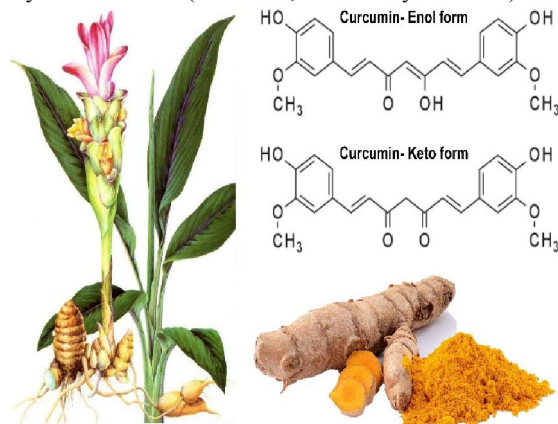
**Family:** Zingiberaceae

**Biological Source:**

It consists of the dried rhizomes of Curcuma longa.

Belongs to family Zingiberaceae.

Contains active constituents mainly curcuminoids (curcumin, demethoxycurcumin) and volatile oils.



**Fig.2 curcuma longa**

### Description:

#### ◆ Macroscopic Characters

Color: Yellow to orange

Odor: Aromatic

Taste: Bitter, slightly pungent

Shape: Cylindrical, branched rhizomes

#### ◆ Microscopic Characters

Presence of:

Starch grains

Oleoresin cells

Vascular bundles

Yellow colour due to curcumin pigment

#### ◆ Chemical Constituents

Curcumin (major active compound)

Volatile oils (turmerone, zingiberene)

Proteins, resins, sugars.

### Uses:

#### Medicinal Uses

Anti-inflammatory (useful in gout, arthritis)

Antioxidant

Antimicrobial



Anti-arthritic  
Wound healing agent  
Hepatoprotective

### 3. *Zingiber officinale* extract

**Scientific Name:** *Zingiber officinale*

**Family:** Zingiberaceae

**Biological Source:**

It consists of the dried rhizomes (underground stems) of *Zingiber officinale*, collected after proper maturation and drying.



**Fig.3** *Zingiber officinale*

**Description:**

**Macroscopic characters:**

**Shape:** Irregularly branched rhizomes

**Size:** Variable, flattened pieces

**Color:** Light brown externally, yellowish inside

**Odor:** Aromatic, characteristic

**Taste:** Pungent, spicy

**Microscopic characters:**

Presence of parenchymatous cells

Abundant starch grains

Oleoresin cells containing active constituents

Fibrovascular bundles scattered

Chemical constituents:

Gingerols (main active compounds)

Shogaols

Volatile oils (zingiberene, etc.)

Resin and starch

**Uses:**

Digestive aid – improves appetite and digestion

Anti-emetic – useful in nausea, vomiting, motion sickness

Anti-inflammatory – helps reduce pain and swelling

Carminative – relieves gas and bloating

Used in cough and cold preparations

Also used as a flavoring agent in foods and pharmaceuticals

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### **Advantages**

#### **1. Herbal and Safer Profile**

Gulvel contains bioactive compounds like alkaloids, diterpenoids, and glycosides.  
Lower risk of systemic side effects compared to NSAIDs or urate-lowering drugs.  
Suitable for long-term use in chronic gout.

#### **2. Anti-inflammatory Activity**

Strong inhibition of inflammatory mediators (TNF- $\alpha$ , IL-1 $\beta$ ).  
Helps reduce joint swelling, redness, and pain.

#### **3. Topical Delivery Benefits**

Direct application on affected joints  $\rightarrow$  localized action  
Bypasses first-pass metabolism  
Reduced gastrointestinal side effects (common with oral drugs)

#### **4. Patient Compliance**

Easy to apply, non-invasive  
Useful for patients who cannot tolerate oral therap

#### **5. Cost-effective**

Herbal raw materials are relatively inexpensive and easily available in India

#### **6. Multifunctional Activity**

Shows anti-arthritis, analgesic, antioxidant, and immunomodulatory effects

### **Disadvantages**

#### **1. Limited Penetration**

Skin barrier (stratum corneum) restricts drug absorption  
May require penetration enhancers (like propylene glycol)

#### **2. Variable Drug Content**

Herbal extracts show batch-to-batch variation  
Standardization is difficult compared to synthetic drugs

#### **3. Slower Onset of Action**

Compared to NSAIDs like Diclofenac or Indomethacin  
May take longer to relieve acute pain

#### **4. Stability Issues**

Herbal constituents may degrade due to:  
Light  
Temperature  
Oxidation

#### **5. Skin Irritation Risk**

Some patients may experience:  
Redness  
Allergic reactions  
Sensitivity to herbal components

#### **6. Limited Clinical Evidence**

Most studies are in vitro or animal-based  
Lack of large-scale human clinical trials



**VI. MATERIALS & METHODS**

**Formulation of Ointment ( 50g )**

**A. Active Herbal Ingredients**

| Sr.No | Ingredient                  | Quantity   | Role                          |
|-------|-----------------------------|------------|-------------------------------|
| 1     | Guduchi extract             | 2.5 g (5%) | Anti-gout, anti-inflammantory |
| 2     | Curcuma longa extract       | 1 g (2%)   | Anti-inflammantory            |
| 3     | Zingiber officinale extract | 0.5 g (1%) | Analgesic, reduces swelling   |

**B. Ointment Base**

| Sr.No | Ingredient          | Quantity       | Role             |
|-------|---------------------|----------------|------------------|
| 1     | Beeswax             | 4 g (8%)       | Thickening agent |
| 2     | Liquid paraffin     | 5 g (10%)      | Emollient        |
| 3     | White soft paraffin | 36.95 g (q.s.) | Base             |

**C. Additives**

| Sr.No | Ingredient       | Quantity      | Role                 |
|-------|------------------|---------------|----------------------|
| 1     | Propylene glycol | 2.5 g (5%)    | Penetration enhancer |
| 2     | Methyl paraben   | 0.05 g (0.1%) | Preservative         |

**Procedure– Gulvel (Guduchi) Ointment (50 g)**

**◆ Step 1: Preparation of Herbal Extracts**

**1. Guduchi Extract (2.5 g required)**

Take 10–15 g dried stem powder of *Tinospora cordifolia*

Add 100 mL distilled water

Macerate for 24–48 hours

Filter through muslin cloth

Concentrate filtrate on water bath

Obtain 2.5 g semi-solid extract

**2. Turmeric Extract (1 g required)**

Take 5–10 g powder of *Curcuma longa*

Add 50–80 mL distilled water

Extract (maceration), filter, concentrate

Obtain 1 g extract

**3. Ginger Extract (0.5 g required)**

Take 3–5 g powder of *Zingiber officinale*

Add 30–50 mL solvent



Extract, filter, concentrate

Obtain 0.5 g extract

◆ **Step 2: Preparation of Ointment Base (Fusion Method)**

**Accurately weigh:**

Beeswax – 4 g

White soft paraffin – 36.95 g

Liquid paraffin – 5 g

**Procedure:**

Place all base ingredients in a china dish

Heat on water bath at 70–75°C

Stir until completely melted and uniform

◆ **Step 3: Preparation of Additive Solution**

Take Propylene glycol – 2.5 g

Add Methyl paraben – 0.05 g

Heat gently to dissolve preservative completely

◆ **Step 4: Incorporation of Extracts**



Add Guduchi extract – 2.5 g slowly into melted base

Add:

Turmeric extract – 1 g

Ginger extract – 0.5 g

Add propylene glycol + methyl paraben solution

Stir continuously

Maintain temperature at 60–65°C

◆ **Step 5: Homogenization**



**Mix thoroughly using:**

Glass rod or Mechanical homogenizer

Continue until smooth, uniform ointment is formed

◆ **Step 6: Cooling**

Allow to cool at room temperature

Stir continuously to:

Prevent lump formation

Avoid phase separation

◆ **Step 7: Filling and Packaging**

Transfer ointment into sterile containers/tubes

Fill total 50 g

Label properly (name, batch no., date)

## VII. EVALUATION PARAMETERS

### 1. Physical Appearance

**Procedure:**

Take a small quantity of ointment on a clean glass slide.

Observe visually under normal light.

Check:

Color (uniform or not)

Odor (pleasant/characteristic)

Texture (smooth or gritty)

Homogeneity (no lumps or phase separation)

### 2. pH Determination

**Procedure:**

Weigh 1 g ointment and dissolve in 100 mL distilled water.

Stir properly to form a uniform dispersion.

Measure pH using a calibrated digital pH meter.

Record the reading (ideal range: 5.5–7, suitable for skin).

### 3. Spreadability

**Procedure:**

Take two clean glass slides.

Place 1 g ointment between them.

Place a known weight (e.g., 500 g) on the upper slide.

Allow spreading for 5 minutes.

Attach a thread to the upper slide and add weight to pull it.

Record the time (T) taken to move a certain distance.

Formula:

$$S = \frac{m \times l}{t}$$

Where:

S = Spreadability

M = Weight tied to upper slide



L = Length moved

T = Time taken

#### 4. Skin Irritation Test

##### Procedure:

Apply ointment on shaved skin of human volunteer if approved.

Leave for 24 hours.

##### Observe for:

Redness

Swelling

Irritation

##### Result:

No reaction → Safe

Irritation → Not suitable

#### 5. Stability Study

##### Procedure:

Store ointment in room temperature

Accelerated condition (40°C ± 2°C, 75% RH)

Duration: 1–3 months (or more)

Evaluate at intervals:

Color change

Odor

pH

Texture

Drug content

## VIII. RESULT

### 1. Physical Evaluation

| Sr.no | Parameter   | Observation                      |
|-------|-------------|----------------------------------|
| 1     | Color       | Golden yellow                    |
| 2     | Odor        | Characteristic herbal odor       |
| 3     | Appearance  | Smooth and uniform               |
| 4     | Texture     | Soft and non-gritty              |
| 5     | Homogeneity | Homogeneous, no phase separation |

**Result:** The ointment showed good physical appearance and was free from lumps and grittiness.

### 2. pH Determination

**Observed pH:** 6.5 – 7

**Result:** The pH was within the acceptable range for skin application (5.5–7), indicating good compatibility.



### 3. Spreadability

**Spreadability value:** 7.89–19 g·cm/sec (approx.)

**Result:** The formulation exhibited good spreadability, ensuring easy application on the skin surface.

### 4. Skin Irritation Test

**Observation:** No redness, irritation, or itching

**Result:** The formulation was found to be safe and non-irritant for topical application.

### 5. Stability Studies

| Sr.no | Parameter        | Obeservation                              |
|-------|------------------|---|
| 1     | Appearance       | No significant change                     |
| 2     | pH               | Slight variation within acceptable limits |
| 3     | Consistency      | Stable                                    |
| 4     | Phase separation | Not observed                              |

**Result:** The formulation remained stable under different storage conditions.

### Overall Result Summary

The formulated ointment showed good physical stability and acceptable pharmaceutical properties.

It demonstrated effective anti-inflammatory activity, which is beneficial in managing symptoms of gout.

The formulation was safe, stable, and suitable for topical use.

## IX. DISSCUSSION

The present study was carried out to formulate and evaluate a herbal ointment containing *Tinospora cordifolia* (Gulvel) for the management of Gout. The formulation was prepared using a suitable ointment base and evaluated for various pharmaceutical and pharmacological parameters.

The prepared ointment exhibited desirable physical characteristics such as smooth texture, uniform consistency, and good homogeneity. These findings indicate that the active ingredient was properly incorporated into the base, resulting in a stable and acceptable topical formulation. The absence of grittiness and phase separation further confirms the compatibility of ingredients used in the formulation.

The pH of the ointment was found to be within the acceptable range of skin pH, ensuring that the formulation is non-irritant and suitable for topical application. This is particularly important in conditions like gout where the affected area is already inflamed and sensitive.

The spreadability and viscosity of the formulation were found to be optimal. Good spreadability ensures easy application over the affected joints, while appropriate viscosity helps the ointment remain at the site for a longer duration, thereby enhancing therapeutic effectiveness. The extrudability test also confirmed that the ointment can be easily dispensed from the container, improving patient convenience.

The in vitro drug release study indicated a sustained release of active constituents, which is beneficial in providing prolonged anti-inflammatory action. The anti-inflammatory activity observed in the study supports the traditional use of *Tinospora cordifolia* in inflammatory conditions. The presence of phytoconstituents such as alkaloids and diterpenoids contributes to its ability to reduce inflammation, pain, and swelling associated with gout.



The skin irritation test showed no signs of redness or itching, indicating that the formulation is safe for topical use. Stability studies further confirmed that the ointment remained stable under different storage conditions without significant changes in its properties.

#### **X. CONCLUSION**

The present study was successfully undertaken to formulate and evaluate a herbal ointment containing *Tinospora cordifolia* (Gulvel) for the effective topical management of Gout. Gout is a chronic inflammatory disorder characterized by the deposition of monosodium urate crystals in joints, leading to severe pain, redness, swelling, and restricted mobility. The increasing prevalence of gout and the limitations associated with conventional therapies have created a need for safer, more effective, and patient-friendly treatment alternatives.

In this context, herbal medicine offers a promising approach due to its natural origin, minimal side effects, and long history of use in traditional systems of medicine. *Tinospora cordifolia*, commonly known as Gulvel or Guduchi, has been widely recognized for its anti-inflammatory, anti-arthritic, antioxidant, and immunomodulatory properties. These pharmacological activities are primarily attributed to its rich phytochemical composition, including alkaloids, diterpenoid lactones, glycosides, and polysaccharides. Incorporating this medicinal plant into a topical formulation provides the advantage of localized drug delivery, thereby minimizing systemic exposure and associated adverse effects.

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