# "Phytochemical Analysis of *Crinum latifolium* Bulb Extract"

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***ABSTRACT***

*Crinum latifolium Linn.*, a medicinally important plant belonging to the family Amaryllidaceae, is widely distributed across tropical, subtropical, and warm temperate regions of the world. It is a perennial herb well known for its attractive flowers and strong therapeutic potential. Traditionally, different parts of this plant such as bulbs, leaves, and roots have been extensively used in various systems of medicine for the treatment of several ailments. The plant is particularly rich in a wide range of bioactive phytochemical constituents, including alkaloids, flavonoids, terpenoids, steroids, glycosides, saponins, tannins, and phenolic compounds. Among these, alkaloids are considered the major active constituents responsible for many of its pharmacological properties. The presence of these compounds contributes to the plant's broad spectrum of biological and medicinal activities. Traditionally, it has been used to treat various inflammatory and infectious conditions such as swelling, wounds, boils, abscesses, and skin infections. The plant has demonstrated a variety of pharmacological activities, including antitumor, anti-inflammatory, antioxidant, analgesic, antimicrobial, hepatoprotective, and antidiabetic effects. The study supports the traditional claim that the glycosides present. In *Crinum latifolium* bulb help in the treatment of abscesses by promoting the rapid drainage of pus, reducing local inflammation, and accelerating the healing process of the affected tissue. These findings indicate that the glycoside-rich extract can serve as a potential natural therapeutic agent for managing abscesses and related skin infections. Even though much has beenreported on the medicinal properties of *Crinum latifolium*, only an estimated 5% of the species worldwide are represented in these analyses, as reviewed in this paper for phytochemical and pharmacological potential.

**Keywords:**

*Crinum latifolium Linn.*; Amaryllidaceae; medicinal plant; phytochemical constituents; alkaloids; glycosides; pharmacological activities; abscess treatment; anti-inflammatory activity; antimicrobial activity; wound healing; traditional medicine.

## I. INTRODUCTION

Medicinal plants have played a crucial role in human health since ancient times and continue to form the backbone of traditional and modern therapeutic systems. They represent one of the most valuable natural sources of bioactive compounds and remain indispensable to ethnomedicine, pharmacology, and drug discovery. According to the World Health Organization, more than 80% of the global population relies on plant-based medicines for primary healthcare, particularly in developing countries where systems such as Ayurveda, Traditional Chinese Medicine (TCM), and Siddha are extensively practiced. Medicinal plants are rich in diverse phytochemical constituents such as alkaloids, flavonoids, phenolics, terpenoids, and glycosides, which exhibit a wide range of pharmacological activities. Many modern drugs have originated from plant-derived compounds, emphasizing the importance of systematic exploration and conservation of medicinal flora (Ghosal *et al.*, 1983).

The family Amaryllidaceae is a widely distributed plant family comprising approximately 93 genera and more than 1,300 species worldwide. Plants belonging to this family are well known for their ornamental as well as medicinal value. The genus Crinum consists of perennial, bulbous herbs commonly found in marshy lands, riverbanks, and coastal regions of tropical and subtropical areas. Several *Crinum* species have been traditionally used for their anti-inflammatory, analgesic, antimicrobial, antiviral, antitumor, and immunomodulatory activities. The genus is particularly rich in unique Amaryllidaceae alkaloids, including lycorine, crinamine, haemanthamine, and crinine, which are recognized for their potent biological activities, especially anticancer and antimicrobial effects (Yakandawala & Samarakoon, 2006; Refaat *et al.*, 2018).

*Crinum latifolium* L., a prominent member of the Amaryllidaceae family, is a perennial herb native to Southeast Asia, including India, Vietnam, Thailand, and Bangladesh. In traditional Ayurvedic medicine, it is commonly known as *Sudarsana* and has been extensively used for the treatment of inflammatory conditions, gastrointestinal disorders, gynecological ailments, abscesses, and immune-related diseases. Morphologically, the plant is characterized by long, lance-shaped leaves, large underground bulbs, and trumpet-shaped flowers ranging from pink to white. Owing to its therapeutic efficacy, *C. latifolium* has gained significant attention in recent years for its role in managing benign prostatic hyperplasia (BPH), tumors, and chronic inflammatory conditions (Chen & Huo, 2018; Nguyenhy, 2013).

Phytochemical investigations of *Crinum latifolium* have revealed the presence of a wide array of bioactive constituents, including alkaloids, flavonoids, saponins, phenolic compounds, glycosides, and terpenoids. Early phytochemical studies reported the isolation of several alkaloids such as lycorine, crinamine, augustamine, crinane-type alkaloids, and β-carboline derivatives, which are responsible for many of the plant's pharmacological activities (Ghosal *et al.*, 1983; Tran *et al.*, 2018). Physicochemical and preliminary phytochemical evaluations of the leaves further confirmed the presence of therapeutically important secondary metabolites (Yadav *et al.*, 2016).

Extensive pharmacological studies have validated the traditional uses of *C. latifolium*. Extracts of the plant have demonstrated significant anthelmintic, antioxidant, thrombolytic, antimicrobial, cytotoxic, anti-inflammatory, and immunomodulatory activities. The antioxidant and total phenolic content of *C. latifolium* extracts have been shown to contribute to their protective effects against oxidative stress (Aziz *et al.*, 2014). In vitro studies have also reported thrombolytic potential and the presence of bioactive phytochemicals in leaf extracts (Dewan & Das, 2013). Furthermore, aqueous and alcoholic extracts have exhibited immunomodulatory effects by enhancing macrophage activity and influencing immune cell proliferation (Zvetkova *et al.*, 2001; Nguyenhy, 2013).

The medicinal significance of *C. latifolium* is also attributed to its glycoside-rich bulb extracts, which have been traditionally used in the treatment of abscesses and skin infections. These glycosides promote rapid drainage of pus, reduce local inflammation, and accelerate tissue healing, thereby supporting the plant's folkloric applications. Toxicological evaluations suggest that the plant is generally safe at therapeutic doses; however, caution is advised at higher concentrations due to the cytotoxic nature of certain alkaloids (Yadav *et al.*, 2016).

Overall, *Crinum latifolium* represents a valuable medicinal plant with immense therapeutic potential. Scientific validation of its traditional claims, coupled with ongoing phytochemical and pharmacological research, highlights

its promise as a source of novel bioactive compounds. Further studies focusing on formulation development, safety evaluation, and sustainable utilization are essential to harness its full potential in modern medicine and drug discovery.

## I. MATERIALS AND METHODS

### Processing of Plant Material

1. ***Collection of the Plant Material*** **:** Fresh and healthy bulbs about 50gm of *Crinum latifolium* Linn were collected. The plant material was cleaned thoroughly with distilled water to remove soil and dust particles.
2. ***Identification of Plant*** **:** The plant was identified and authenticated based on its morphological. Characteristics, including its long strap-shaped leaves and distinct pinkish-white, trumpet-shaped flowers, with reference to standard taxonomic keys and floras.
3. ***Drying of Plant Material*** **:** The cleaned bulb pieces were shade dried at room temperature for 10–15 days. Shade drying was preferred to preserve heat-sensitive phytoconstituents. The material was turned periodically to ensure uniform drying. Drying was continued until a constant weight was obtained and the sample became crisp.
4. ***Powdering of Dried Material*** **:** The completely dried bulb material was ground into coarse powder using a clean mechanical grinder. The powdered material was sieved to obtain uniform particle size. Accurately weigh required mass of 50.0 gms of powdered material. The powder was stored in an airtight container, protected from moisture, sunlight, and contamination for further use in extraction

### Preparation of Plant Extract :

1. ***Weighing of Plant Material***: Dried and powdered bulbs of *Crinum latifolium* were used for the preparation of extract. An accurately weighed quantity of 25 g of bulb powder was taken using an analytical balance.
2. ***Selection of Solvent:*** Ethanol (70%) was used as the extraction solvent because it is a polar organic solvent that can dissolve a wide range of phytochemicals such as alkaloids, flavonoids, tannins, phenolic compounds, and glycosides. Ethanol is also less toxic and suitable for biological studies. Ethanol efficiently extracts both polar and semi-polar compounds, giving a broad-spectrum extract.
3. ***Soaking of Plant Material:*** The powdered plant material was transferred into a clean, dry conical flask, and 125 mL of 70% ethanol was added to ensure complete immersion of the sample.
4. ***Sealing of Flask:*** The mouth of the flask was tightly covered with aluminium foil to prevent solvent loss by evaporation and to protect the contents from contamination.
5. ***Maceration:*** The flask was kept at room temperature (25–30 °C) for 72 hours (3 days). During this period, the mixture was shaken occasionally (2–3 times daily) to ensure proper solvent penetration and facilitate dissolution of the phytoconstituents from the plant cells into the solvent.
6. ***Filtration:*** After 72 hours, the extract was first filtered through muslin cloth to remove coarse particles and then through Whatman filter paper No. 1 to obtain a clear filtrate.

**PHYTOCHEMICAL SCREENING :**

***1. Tests for Alkaloids***

***a. Mayer's Test:*** Take 2 mL of acidic plant extract, add 2–3 drops of Mayer's reagent along the side of the test tube, mix gently, and observe for cream-colored precipitate.

***b. Wagner's Test:*** Take 2 mL of plant extract, add 2–3 drops of Wagner's reagent, shake gently, and observe for formation of reddish-brown precipitate or color change.

***2. Test for Flavonoids***

***a. Alkaline Reagent Test*:** Add 2 mL of ethanolic extract to a test tube, add 1 mL of 10% NaOH to observe yellow coloration, then add a few drops of dilute HCl and note disappearance of yellow color.

***3. Test for Saponins***

***a. Foam (Froth) Test:*** Take 2 mL of extract in a test tube, shake vigorously for 15–30 seconds, allow to stand for 10 minutes, and observe for stable persistent froth.

***4. Tests for Tannins and Phenolic Compounds***

***a. Ferric Chloride Test:*** Take 1 mL of extract, add 2–3 drops of freshly prepared 5% ferric chloride solution, mix gently, and observe for brown or dark coloration.

***b. Gelatin Test:*** Mix 1 mL of extract with 1 mL of 1% gelatin solution containing sodium chloride, shake well, allow to stand, and observe for precipitate formation.

***5. Test for Terpenoids***

***a. Salkowski Test:*** Take 2 mL of ethanolic extract, add 2 mL of chloroform, carefully add 1 mL of concentrated sulfuric acid along the side of the test tube without shaking, and observe color change at the interface.

***6. Tests for Glycosides***

***a. Keller–Killiani Test (Cardiac Glycosides):*** Take 2 mL of plant extract, add 1 mL of glacial acetic acid containing trace ferric chloride, carefully add 1 mL of concentrated sulfuric acid along the side of the test tube, and observe color formation at the junction of layers.

***b. Bornträger's Test (Anthraquinone Glycosides):*** Take 2 mL of extract, add 2 mL of 5% dilute HCl, boil for 5 minutes in a water bath, cool and filter, extract the filtrate with chloroform, separate the chloroform layer, add equal volume of 10% ammonia solution, and observe color change.

***7. Tests for Carbohydrates***

***a. Molisch Test:*** Take 2 mL of aqueous extract, add 2 drops of Molisch reagent, carefully add 1 mL of concentrated sulfuric acid along the side of the test tube, and observe formation of violet ring at the interface.

***b. Benedict's Test:*** Mix 2 mL of extract with 2 mL of Benedict's reagent, heat in a boiling water bath for 2–5 minutes, cool, and observe color change or precipitate formation.

***8. Test for Coumarins***

***a. UV Fluorescence Test:*** Place one drop of extract on a Petri dish, add one drop of 10% ammonium hydroxide, allow to stand for 1–2 minutes, and observe under UV light at 365 nm.

***9. Test for Proteins and Amino Acids***

***a. Ninhydrin Test:*** Take 2 mL of extract, add 1–2 drops of ninhydrin reagent, heat in a boiling water bath for 1–2 minutes, cool, and observe color development.

**THIN LAYER CHROMATOGRAPHY (TLC)**

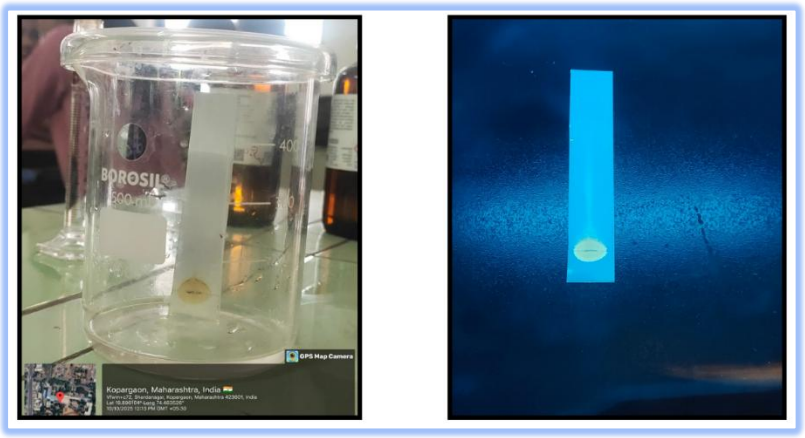
TLC was performed to analyze the phytoconstituents present in the ethanolic bulb extract of *Crinum latifolium.* The concentrated extract was applied as small spots on silica gel TLC plates and developed using a solvent system of toluene : ethyl acetate : formic acid (7:2.5:0.5 v/v/v). The plates were developed in a pre-saturated chamber by capillary action until the solvent front reached three-fourths of the plate height. After air-drying, the chromatograms were visualized under UV light at 254 and 366 nm. Distinct spots were observed, indicating the presence of multiple phytochemical constituents, and Rf values were calculated for characterization.

## II. RESULT TABLE

| Sr.No. | Phytochemical Tests | Observation | Result |
|---|---|---|---|
| 1. | **Tests For Alkaloids** | | |
| | **Mayer's Test** | Cream colour | + |
| | **Wagner's Test** | Yellowish brown | + |
| 2. | **Test For Flavonoids** | | |
| | **Alkaline Reagent Test** | Yellow colour disappeared after acidification | + |
| 3. | **Test For Saponins** | | |
| | **Foam/Froth test** | Persistent stable froth | + |
| 4. | **Test For Tannins and Phenolics** | | |
| | **Ferric Chloride Test** | Brown colour | + |
| | **Gelatine Test** | No ppt | - |
| 5. | **Test For Terpenoids** | | |
| | **Salkowski Test** | Faint brown- grayish | + |
| 6. | **Test For Glycosides** | | |
| | **Killer-killiani Test** | Redish ring appeared at junction | + |
| | **Bornträger's Test** | Colourless Solution | - |
| 7. | **Test For Carbohydrates** | | |
| | **Molisch Test** | Violet Purple ring | + |
| | **Benedict Test** | Greenish Colour | + |
| 8. | **Test For Caumarin / UVFluorescence Test** | | |
| | **Caumarin Test** | No fluorescence | - |
| 9. | **Test For Amino acids** | | |
| | **Ninhydrin Test** | Yellow colour form | + |

**Thin Layer Chromatography Result**

Thin layer chromatography of the ethanolic bulb extract of *Crinum latifolium* revealed the presence of multiple phytoconstituents. The developed TLC plate using toluene : ethyl acetate : formic acid (7:2.5:0.5 v/v/v) as the mobile phase showed several distinct spots under UV light at 254 nm and 366 nm, indicating a complex phytochemical profile. The observed spots correspond with the preliminary phytochemical screening, confirming the presence of alkaloids, flavonoids, saponins, tannins, phenolics, terpenoids, glycosides, carbohydrates, and amino acids, while coumarins and anthraquinone glycosides were absent. The TLC results thus support and validate the qualitative phytochemical analysis of *Crinum latifolium* bulb extract.




THIN LAYER CHROMATOGRAPHY

**Rf Values of TLC of *Crinum latifolium* Bulb Extract**

| | | | | |
|---|---|---|---|---|
| 1. **Rf** = 0.5/6.2 | 2. **Rf** = 1.0/6.2 | 3. **Rf** = 2.1/6.2 | 4. **Rf** = 3.2/6.2 | 5. **Rf** = 4.3/6.2 |
| **0.08** | **0.16** | **0.33** | **0.51** | **0.69** |

## III. CONCLUSION

The present study on *Crinum latifolium* bulb extract confirmed the presence of several important phytochemical constituents such as alkaloids, flavonoids, glycosides, saponins, tannins, phenolic compounds, terpenoids, and carbohydrates. These bioactive compounds contribute to the plant's significant medicinal and therapeutic potential.

The ethanolic extract prepared by maceration method showed positive results in various qualitative phytochemical tests, indicating that ethanol is an effective solvent for extracting both polar and semi-polar compounds. Thin Layer Chromatography (TLC) of the ethanolic extract, using the solvent system Toluene : Ethyl acetate : Formic acid (7:2.5:0.5), revealed multiple distinct spots under UV light, confirming the presence of different phytoconstituents with varying polarities.

The Rf values obtained from the TLC analysis (0.08, 0.16, 0.33, 0.51, and 0.69) indicate the separation of several active compounds in the extract. These findings support the traditional medicinal uses of Crinum latifolium and demonstrate its potential as a natural source of therapeutic agents.

Thus, the study concludes that *Crinum latifolium* bulb possesses diverse phytochemical compounds that can be further isolated, identified, and characterized for their pharmacological properties in future research.

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