

# Pharmacological Activities of *Ipomoea carnea*: A Comprehensive Review

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**Abstract**—the genus *Ipomoea* includes a diverse range of species commonly found growing in roadside wastelands and along canals. *Ipomoea carnea* is a species that can reach a height of up to 600 centimeters. It has a straight, woody, bushy, and slightly cylindrical structure with a greenish hue. Commonly known as Besharm (बेशर्म) or bush morning glory, *Ipomoea carnea* features a stem with varied leaf types. This plant is used as a traditional remedy in Ayurveda, Siddha, and Unani medicine systems. Phytomedicines are gaining recognition in modern medicine, and the shrub *Ipomoea carnea* has been used in traditional medicine for thousands of years. Despite its long history of use, scientific research on this plant is limited and scattered. This review gathers and summarizes the current knowledge on *I. carnea*, highlighting its medicinal benefits. Various extracts of *I. carnea* show activity against bacteria, fungi, and cancer, and have antioxidant, anti-inflammatory, anti-diabetic, and wound-healing properties. It also has anti-convulsant, immunomodulatory, anxiolytic, and sedative effects. However, some toxic effects have been reported as well. The review discusses key phytochemicals responsible for these effects and suggests that *I. carnea* could be valuable for developing new medicines.

**Index Terms**—biological activities, chemical constituents, *Ipomoea*, *Convolvulaceae*, review, cultural uses

## I. INTRODUCTION

*Ipomoea carnea* is a plant that grows up to 6 meters tall and can be shorter in aquatic habitats. Its stem is thick and has several thick branches. The plant has simple, petiolate leaves, which are light green and heart-shaped. It blooms in clusters of 4 inch pink flowers in spring and summer, with a glabrous capsule. The plant is scientifically known as *Ipomoea crassicaulis* and *Ipomoea fistulosa*. The seed has three sides with two flat ventral surfaces and a central depression

*Ipomoea carnea*, also known as Besharm or morning glory, is a large shrub native to India that has spread worldwide, including to Java and Indonesia. It grows in lowland areas near water and is used as an ornamental and hedge plant. It reproduces quickly by rooting its stems.

The plant contains various bioactive compounds such as phenolic acids, alkaloids, flavonoids, coumarins, and sterols. It is also used as green manure to improve soil fertility and increase crop yields. In India, it is grown in tropical regions like Chhattisgarh and Madhya Pradesh.

*Ipomoea carnea* has several uses:

- Its stems are used to make paper and as firewood.
- It has sedative and anticonvulsant properties similar to marselein.
- The leaves are used as fertilizer.
- A glycosidicsaponin with anticancer and oxytocic effects has been isolated from it



Figure 1: *Ipomoea Carnea* Plant

Taxonomic Rank	Category
Kingdom	Plantae
Phylum	Angiosperms (Magnoliophyta)
Class	Eudicots
Order	Solanales
Family	Convolvulaceae
Genus	<i>Ipomoea</i>
Species	<i>Ipomoea carnea</i>

Table No. : 01

Aspect	Details
Type	Perennial flowering plant
Growth Habit	Climbing vine or sprawling shrub
Height	2 to 4 meters (6 to 13 feet)
Stem	Flexible, woody base in mature plants
Leaves	Heart-shaped or lanceolate, 10-20 cm in length, green, smooth
Flowers	Trumpet-shaped or funnel-shaped, 5-10 cm in diameter, pink, white, or lavender
Blooming Season	Spring to autumn
Fruit Type	Capsule
Seed Characteristics	Small, roundish, brown to reddish-brown
Native Range	Tropical and subtropical Americas
Preferred Environment	Wetlands, riverbanks, moist, disturbed areas
Soil Requirements	Well-drained soils, tolerant of waterlogged conditions

Table No. : 02



Figure 2 : Ipomoea carnea Flower

Aspect	Details
Flower Type	Trumpet-shaped or funnel-shaped
Color	Typically pink, can also be white or pale lavender
Size	Approximately 5-10 cm in length and diameter
Petals	Five fused petals forming a trumpet shape
Sepals	Five green, pointed, leaf-like sepals

<b>Stamens</b>	Five stamens fused into a tube
<b>Pistil</b>	Central structure including ovary, style, and stigma
<b>Blooming Season</b>	Spring to autumn, depending on climate and conditions
<b>Pollination</b>	Attracted by bees, butterflies, and other pollinators
<b>Aesthetic Value</b>	Often grown as an ornamental plant for its attractive flowers
<b>Growing Conditions</b>	Prefers warm climates and well-drained soils; requires regular watering
<b>Pruning</b>	Regular pruning to encourage blooms and maintain shape

Table No. : 03



Figure 3: Ipomoea Carnea Fruits

Aspect	Details
<b>Fruit Type</b>	Capsule
<b>Shape</b>	Globose to ovoid
<b>Size</b>	Approximately 1-2 cm in diameter
<b>Color</b>	Green when immature, turning reddish- when mature
<b>Dehiscence</b>	Capsule splits open to release seeds
<b>Seed Characteristics</b>	Flat, smooth, brown to reddish-brown seeds
<b>Dispersal Mechanism</b>	Seed release, water dispersal, and possible animal dispersal
<b>Ecological Role</b>	Contributes to reproduction and spread of the species

Table No. : 04



Figure 4: Ipomoea Carnea Roots

As depicted in fig. 4 the roots of this plant are generated from the stem.

Aspect	Details
<b>Root Type</b>	Fibrous root system
<b>Structure</b>	Thin, branched, and extensive network
<b>Color</b>	Light brown or beige
<b>Function</b>	Water and nutrient absorption, stability, soil stabilization
<b>Ecological Uses</b>	Phytoremediation, habitat provision, soil erosion prevention
<b>Traditional Uses</b>	Used in some traditional medicine for purported anti-inflammatory effects
<b>Culinary Uses</b>	Less commonly used compared to leaves and shoots
<b>Cultivation</b>	Can be propagated from seeds or cuttings; requires management to prevent invasiveness

Table No. : 05



Figure 5: Ipomoea Carnea Seeds

Aspect	Details
<b>Appearance</b>	Small, flat, roundish to oval, brown to reddish-brown seeds
<b>Size</b>	Approximately 4-6 mm in diameter
<b>Texture</b>	Hard, woody
<b>Dispersal Mechanism</b>	Water dispersal, possible animal or human-mediated dispersal
<b>Growth Rate</b>	Rapid growth, maturity within a few months
<b>Germination Conditions</b>	Warm temperatures (25-30°C), may require soaking or scarification
<b>Culinary Uses</b>	Young shoots and leaves used in some Southeast Asian cuisines
<b>Ecological Uses</b>	Phytoremediation, absorption of pollutants
<b>Traditional Medicine</b>	Used for purported anti-inflammatory and analgesic properties
<b>Toxicity</b>	Potentially toxic if ingested in large quantities
<b>Cultivation</b>	Propagated by seeds, requires careful management to avoid invasive behavior

Table No. 06

## Pharmacological Studies -

### Immuno-modulatory Effects

In studies with female rats, nor tropane alkaloids such as calystegines B1, B2, B3, and C1, along with the indolizidine alkaloid swainsonine derived from *Ipomoea carnea*, were found to impact the spleen-to-body weight ratio, thymus-to-body weight ratio, and induce histological changes.

### Anti-oxidant Activity

Antioxidants prevent oxidation by neutralizing reactive free radicals and are crucial for protecting against degenerative diseases. *Ipomoea carnea* is rich in polyphenols and flavonoids, particularly concentrated in its leaves, stems, and flowers. These compounds exhibit strong DPPH radical scavenging capabilities, essential for combating free radical-induced damage. The floral parts of the plant contain higher levels of these antioxidant phytoconstituents.

### Wound Healing Activity

The wound-healing properties of *Ipomoea carnea* were assessed by extracting fresh flowers with 95% ethanol, concentrating the extract, and fractionating it using diethyl ether, chloroform, and ethyl acetate. The presence of kaempferol and its 3-O- $\beta$ -D-glucoside in the flowers has been linked to significant wound-healing potential. The healing process involves stages like inflammation, fibroblast proliferation, collagen synthesis, and scar maturation, with the efficacy of *Ipomoea carnea* surpassing untreated wounds and comparable to Sulphathiazole.

### Anti-Inflammatory Activity

Aqueous extracts from mature green leaves of *Ipomoea carnea* were evaluated for their anti-inflammatory properties at doses of 250 mg/kg and 500 mg/kg body weight. The study demonstrated that the leaves had a notable anti-inflammatory effect at 500 mg/kg, outperforming Etoricoxib.

### Antifungal Activity

*Ipomoea carnea* has shown antifungal activity against species such as *Alternariaalternata* and *Curvularialunata*. Extracts in chloroform and methanol exhibited antifungal efficacy against a range of eleven pathogenic and non-pathogenic fungi. Active fractions, identified as (E)-octadecyl

p-coumarate and (Z)-octadecyl p-coumarate, were particularly effective against *Alternariaalternata* and *A. porri* spore germination.

### Cardiovascular Activity

When administered to an isolated frog heart, an aqueous extract of *Ipomoea carnea* caused a temporary cardiac block lasting 5 to 10 seconds, extending to 2 minutes with increased dosage. This suggests that the plant may exert a positive inotropic effect through mechanisms such as sodium extrusion or intracellular calcium release. The addition of atropine inhibited the early phase of this effect, indicating a potential stimulant action.

### Nervous System Activity

*Ipomoea carnea* is recognized for its neurotoxic effects. In goats consuming fresh leaves, flowers, and stems over 45 to 60 days, symptoms included hirsutism, depression, ataxia, hypermetria, wide-based stance, muscular incoordination, tremors, spastic paresis, abnormal postural reactions, nystagmus, hyperreflexia, sound hypersensitivity, head tilting, and equilibrium loss. The cerebellum, crucial for coordinating muscle movements, is notably affected by the plant's toxicity.

### Anti-hypoglycemic Activity

In a study on rats, alloxan was used to induce hyperglycemia. Blood glucose levels were measured 48 hours post-injection. Hyperglycemic rats were categorized into groups receiving various treatments, including extracts of *Ipomoea carnea* leaves and flowers, rutin, and Metformin. The aqueous extract of *Ipomoea carnea* was found to significantly reduce blood glucose levels and improve glucose tolerance in normal rats.

### Antimicrobial Activity

Research on the antimicrobial properties of *Ipomoea carnea* components has been limited. Crude extracts of the leaves, including those in n-hexane, ethyl acetate, acetone, and ethanol, have demonstrated antibacterial activity. Specifically, the acetone extract was effective against *Proteus vulgaris* and *Salmonella typhimurium*, while the ethanol extract was effective against *Pseudomonas aeruginosa*.

### Hepatoprotective Activity

In a study involving rats, liver damage was induced by administering carbon tetrachloride. Rats were then treated with saline, ethanol extracts of *Ipomoea carnea* leaves and flowers, or silymarin as a standard reference. The hepatoprotective effects were evaluated by measuring serum levels of liver enzymes such as ALT, AST, and ALP at various intervals. Both leaf and flower extracts showed significant hepatoprotective effects.

### Anti-diabetic Activity

The anti-diabetic effects of *Ipomoea carnea* leaves were tested on both normal and streptozotocin-induced diabetic rats. The aqueous extract of the plant was found to effectively lower blood glucose levels and improve glucose tolerance in normal rats.

### Anti-cancer Activity

The hydroalcoholic extract of *Ipomoea carnea* leaves exhibited significant anticancer properties in both in-vitro and in-vivo studies, likely due to the presence of alkaloids, phenols, and flavonoids, which contribute to its dose-dependent anticancer effects.

### Anxiolytic Activity

The anxiolytic effects of aqueous and methanolic extracts of *Ipomoea carnea* leaves were evaluated using tests such as the elevated plus maze, open field test, and hole board test in mice, with diazepam as a positive control. The lethal dose 50 (LD50) for both extracts was 325 mg/kg. The methanolic extract demonstrated stronger anxiolytic effects compared to diazepam and the aqueous extract, evidenced by increased head dipping behavior in the hole board test. In goats, *Ipomoea carnea* consumption led to abnormal behavior and consciousness issues, including difficulty in standing and postural anomalies, with one goat succumbing to the effects. *Ipomoea carnea* exhibits properties characteristic of sedative-hypnotic central depressants. Anxiolytic effects of aqueous and methanolic extracts of *Ipomoea carnea* leaves were evaluated in mice using tests such as the elevated plus maze, open field test, and hole board test, with diazepam serving as the standard. The intra-peritoneal (i.p.) LD50 of the aqueous and methanolic extracts was determined to be 325 mg/kg. The methanolic

extract demonstrated a more pronounced anxiolytic effect compared to the aqueous extract and diazepam. Dose-dependent increases in head dipping behaviors in the hole board test were observed, suggesting significant anxiolytic activity of both extracts. In goats, consumption of *Ipomoea carnea* resulted in behavioral and consciousness disturbances, including difficulties with standing and posture, with one goat dying as a result.

### Mosquitocidal Activity

The synergistic effects of *Ipomoea carnea* extracts with insecticides have been reported against the malarial vector *Anopheles stephensi*. This indicates the potential use of *Ipomoea carnea* extracts in mosquito control strategies.

### Conclusion

*Ipomoea carnea*, a prominent species within the diverse *Ipomoea* genus, is recognized for its extensive range of medicinal properties and applications. This shrub, commonly known as Besharm or bush morning glory, is native to India but has successfully adapted to various global regions. Its applications in traditional medicine systems, such as Ayurveda, Siddha, and Unani, underscore its long-standing historical significance.

Scientific research on *I. carnea*, though limited, reveals promising pharmacological activities. The plant demonstrates substantial antioxidant and anti-inflammatory effects, attributed to its rich content of polyphenols and flavonoids. Additionally, its wound-healing properties, particularly linked to compounds like kaempferol, position it as a significant candidate for therapeutic development. *I. carnea* also exhibits antifungal and anti-diabetic activities, highlighting its potential in managing infections and metabolic disorders.

However, caution is warranted due to its neurotoxic effects, which have been observed in animals consuming the plant. This toxicity, alongside reported adverse effects in certain studies, suggests that while *I. carnea* has valuable medicinal potential, its use must be carefully monitored to avoid negative health outcomes.

The plant's impact on various systems, including its anti-cancer, anxiolytic, and hepatoprotective properties, demonstrates its broad spectrum of therapeutic benefits. Moreover, its potential in mosquito control further extends its utility.

In summary, *Ipomoea carnea* presents a compelling case for further investigation. Despite its promising medicinal properties, further research is needed to fully elucidate its safety profile and optimize its therapeutic applications. The integration of *I. carnea* into modern medicine could offer novel approaches to treatment, provided that its toxicological aspects are thoroughly addressed.

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